Behaviour, Cognitions, and the Environment: The Influence of Contextual Factors and Social-Cognitive Determinants on Handwashing Practices in Infrastructure-Restricted Settings

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Abstract

Even though morbidity and mortality due to diarrhoeal diseases in children less than five years old have declined more than 50% over the past 15 years, diarrheal infections still remain among the leading causes of childhood death in developing countries. Washing hands with soap at critical junctures, such as after defecating and before eating or preparing food, has been shown to be effective in reducing the occurrence of diarrhoea. Still, rates of handwashing with soap in developing countries remain remarkably poor. To effectively promote a desired behaviour, it is first of all important to understand what influences and determines that behaviour. Many health promotion programmes are based on social-cognitive theories that have been developed to understand and predict health behaviour. Although the role of the environment in influencing health behaviour is increasingly being recognized, most interventions still remain by and large focused on individual factors. Research taking into account physical and social environmental influences along with social-cognitive aspects of behaviour and their interactions is limited. The present thesis aims to contribute to the prediction and understanding of handwashing behaviour in infrastructure-restricted settings by focusing on how social-cognitive determinants in combination with the physical and social environment influence handwashing practices across different populations and settings. A theoretical framework is proposed in this thesis that acknowledges the interconnectedness and interdependence of contextual and social-cognitive determinants of behaviour. The framework divides context into the social environment, the physical environment, and characteristics of the individual. The operationalization of the social-cognitive factors was based on the RANAS (risk, attitudes, norms, abilities, self-regulation) model, which integrates key constructs from major social-cognitive models.

The first study was conducted to assess the effect of a large-scale handwashing awareness raising campaign in rural India on changing the participants' intention to wash hands with soap and the underlying social-cognitive determinants. Interviews were conducted with 687 visitors before and after their visit to the event. While only a marginal increase in the visitors' intention to wash hands was found, the results suggest that this unique social, cultural, and informational environment was successful in changing visitors' knowledge of the causes of diarrhoea, beliefs about the benefits of washing hands, feelings of liking and disgust about the behaviour, and injunctive normative beliefs. Still, the marginal increases in the visitors' intentions to wash hands proved that substantively changing behaviour might require more than improving knowledge and emphasizing the importance of washing hands.

The second study was conducted in northern rural Burundi as part of a baseline study for the next project phase and explored the role of environmental factors along with social-cognitive determinants in predicting handwashing practices at household level among caregivers of primary school children (N = 660). Hierarchical regression analyses showed that household wealth, the amount of water available per person in the household, and having a designated location for washing hands were contextual factors that significantly predicted handwashing frequency, whereas the time spent collecting water and the amount of money spent on soap per person per month were not. Adding the RANAS social-cognitive factors to the model substantially improved the prediction of handwashing frequency, while at the same time, the predictive effects of household wealth and having a designated location for handwashing disappeared. The final model indicates that high handwashing frequency is most likely among caregivers who are certain that they can always execute the behaviour before handling food and after contact with stool, who plan when, where, and how to wash hands, and who report not forgetting to wash hands at those critical junctures. The full and partial mediation effects of contextual factors through social-cognitive factors are examples of the potential impact of interactions between these factors on handwashing frequency. The findings suggest that contextual constraints might be perceived rather than actual barriers and highlight the value of psychosocial factors in understanding hygiene behaviours.

In the last study, a survey assessing the RANAS social-cognitive determinants was used to identify the relevant factors underlying primary school children's handwashing practices in rural Burundi and urban Zimbabwe. Interviews were conducted with 669 children enrolled in 20 primary schools in Burundi and 524 children in 20 primary schools in Zimbabwe. While taking into account observational findings on school handwashing characteristics, analyses revealed that information interventions to raise the children's perception of the severity of contracting diarrhoea in Burundi and to enhance knowledge of how to contract and prevent the disease among school children in Zimbabwe should be implemented. Infrastructural interventions were proposed for both countries to enhance the children's confidence in their ability to wash hands after using the latrine. Lastly, an intervention was planned at every school highlighting the commonness of handwashing to tackle social norms. The goal of the intervention strategies is to create an enabling social-relational, informational, and infrastructural environment for handwashing practices at school.

The findings of this thesis indicate that considerably more attention should be given to the role of contextual factors and their interaction with social-cognitive factors when examining

the determinants of handwashing behaviour in infrastructure-restricted settings. In light of the framework proposed here, the results suggest that risk perceptions, attitudes, and social norms are mostly influenced by the social environment, whereas abilities and self-regulation factors are mainly affected by the physical environment. Even though future research is still required to elucidate the role of these factors in producing behavioural change, it is to be hoped that researchers and practitioners will consider environmental aspects and their dynamic interplay with social-cognitive determinants to a far greater extent when designing handwashing programmes.

Zusammenfassung

Obwohl Morbidität und Mortalität aufgrund von Durchfallerkrankungen bei Kindern unter fünf Jahren in den letzten 15 Jahren um mehr als 50% zurückgegangen sind, zählen Durchfallerkrankungen nach wie vor zu den häufigsten Todesursachen bei Kindern in Entwicklungsländern. Händewaschen mit Seife in kritischen Momenten, wie z.B. nach dem Stuhlgang, vor dem Essen oder vor der Zubereitung von Lebensmitteln, hat sich als wirksam erwiesen, um die Prävalenz von Durchfall zu verringern. Dennoch ist die Häufigkeit von Händewaschen mit Seife in Entwicklungsländern bemerkenswert niedrig. Um ein gewünschtes Verhalten wirksam zu fördern, ist es zunächst wichtig zu verstehen, wodurch das Verhalten beeinflusst und bestimmt wird. Viele Programme zur Gesundheitsförderung basieren auf sozial-kognitiven Theorien, die entwickelt wurden, um Gesundheitsverhalten zu verstehen und vorherzusagen. Obwohl die Rolle des Kontextes bei der Beeinflussung von Gesundheitsverhalten zunehmend anerkannt wird, basieren die meisten Massnahmen immer noch weitgehend auf individuellen Faktoren. Untersuchungen die sowohl physische und soziale Umwelteinflüsse, als auch sozial-kognitive Aspekte des Verhaltens und deren Interaktionen berücksichtigen, sind begrenzt. Ziel der vorliegenden Arbeit ist die Vorhersage und das Verständnis von Händewaschverhalten im Kontext begrenzter Infrastruktur mit Fokus auf dem Einfluss sozial-kognitiver Faktoren in Kombination mit der physischen und sozialen Umwelt in verschiedenen Populationen und Kontexten. In dieser Arbeit wird ein theoretisches Modell vorgestellt, das die Vernetzung und gegenseitige Abhängigkeit von kontextuellen und sozial-kognitiven Determinanten des Verhaltens hervorhebt. Das Modell unterteilt Kontext in soziales Umfeld, physische Umwelt und individuelle Eigenschaften. Die Operationalisierung der sozial-kognitiven Faktoren basiert auf dem RANAS Modell (Risiko, Einstellungen, Normen, Fähigkeiten, Selbstregulierung), welches zentrale Konstrukte bestehender sozial-kognitiver Modelle integriert.

Die erste Studie wurde durchgeführt, um die Wirkung einer grossangelegten Sensibilisierungskampagne für Händewaschen im ländlichen Indien zu evaluieren. Diese hatte das Ziel, die Intention der Teilnehmer, sich die Hände mit Seife zu waschen, sowie die zugrunde liegenden sozial-kognitiven Determinanten zu erhöhen. Insgesamt wurden 687 Interviews mit Besuchern direkt vor und nach der Veranstaltung realisiert. Die Intention der Befragten, sich die Hände mit Seife zu waschen, erhöhte sich nur marginal. Die Ergebnisse legen jedoch nahe, dass das soziale, kulturelle und informative Umfeld der Veranstaltung erfolgreich darin war, Wissen über die Ursachen von Durchfall, Überzeugungen über den

Nutzen von Händewaschen, Gefühle des Mögens und der Abscheu bezüglich Händewaschen sowie normative Überzeugungen der Besucher zu verändern. Dennoch zeigt der marginale Anstieg der Intention zum Händewaschen, dass wesentliche Verhaltensveränderung mehr als nur eine Verbesserung des Wissensstandes und eine Betonung der Wichtigkeit von Händewaschen erfordert.

Die zweite Studie wurde im ländlichen Norden Burundis im Rahmen einer Baseline-Erhebung für eine nachfolgende Projektphase durchgeführt. Diese untersuchte die Rolle des gemeinsamen Einflusses von Umweltfaktoren und sozial-kognitiven Faktoren für die Vorhersage von Händewaschverhalten auf Haushaltsebene bei Betreuungspersonen von Grundschulkindern (N = 660). Hierarchische Regressionsanalysen haben gezeigt, dass Haushaltsvermögen, die verfügbare Menge Wasser pro Haushaltsmitglied und das Vorhandensein eines festgelegten Ortes zum Händewaschen die Häufigkeit des Händewaschens signifikant vorhersagen, während der Zeitaufwand zum Wasserholen und die Ausgaben für Seife pro Person und Monat dies nicht tun. Durch Einbezug der sozial-kognitiven Faktoren des RANAS Modells in die Berechnung, wurde die Güte der Vorhersage der Häufigkeit des Händewaschens wesentlich verbessert. Gleichzeitig haben die Vorhersagewerte von Haushaltsvermögen und dem Vorhandensein eines festgelegten Ortes zum Händewaschen an Einfluss verloren. Das endgültige Modell zeigte, dass eine hohe Händewaschhäufigkeit am wahrscheinlichsten ist für Betreuungspersonen, mit folgenden Charakteristika: sie sind sich sicher, dass sie das Verhalten vor dem Kontakt mit Lebensmitteln und nach dem Kontakt mit Fäkalien verlässlich ausführen können; sie planen, wann, wo und wie sie sich die Hände waschen und sie berichten, dass sie nicht vergessen, sich die Hände in den kritischen Momenten zu waschen. Die Effekte der vollständigen und partiellen Mediation der Kontextfaktoren durch sozial-kognitive Faktoren sind Beispiele für die möglichen Effekte von Wechselwirkungen zwischen diesen Faktoren auf die Häufigkeit des Händewaschens. Die Ergebnisse legen nahe, dass kontextuelle Einschränkungen möglicherweise eher wahrgenommene als tatsächliche Hindernisse sind und betonen damit den Wert psychosozialer Faktoren für das Verständnis von Hygieneverhalten.

In der letzten Studie wurde eine Befragung zur Erfassung der sozial-kognitiven Determinanten des RANAS Modells verwendet, um relevante Faktoren für das Händewaschverhalten von Grundschulkindern im ländlichen Burundi und im städtischen Simbabwe zu identifizieren. In jeweils 20 Grundschulen wurden 669 Kinder in Burundi und 524 Kinder in Simbabwe befragt. Unter Berücksichtigung der Beobachtungen von

Händewaschcharakteristika in Schulen, haben die Auswertungen gezeigt, dass für Kinder in Burundi Informationsinterventionen zur Erhöhung der wahrgenommenen Schwere einer Durchfallerkrankung angewendet werden sollen. In Simbabwe sind es Interventionen zur Erhöhung des Wissens über Durchfallursachen und Durchfallprävention. Für beide Länder wurden infrastrukturelle Massnahmen vorgeschlagen, um das Vertrauen der Kinder in ihre Fähigkeit zu erhöhen, sich die Hände nach Benutzung der Latrine zu waschen zu können. Schließlich wurde an jeder Schule eine Intervention zur Betonung der Normalität von Händewaschen geplant, um soziale Normen anzusprechen. Ziel der Interventionsstrategien ist es, ein förderliches sozial-relationales, informationelles und infrastrukturelles Umfeld für Händewaschverhalten in den Schulen zu schaffen.

Die Ergebnisse der vorliegenden Arbeit zeigen, dass der Rolle von Kontextfaktoren und ihrer Interaktion mit sozial-kognitiven Faktoren bei der Untersuchung von Determinanten von Händewaschverhalten in Umgebungen mit begrenzter Infrastruktur deutlich mehr Aufmerksamkeit gewidmet werden sollte. Angesichts des hier vorgeschlagenen theoretischen Modells legen die Ergebnisse nahe, dass Risikowahrnehmung, Einstellungen und soziale Normen meistens durch das soziale Umfeld beeinflusst werden, während wahrgenommene Fähigkeiten und Selbstregulierungsfaktoren vor allem von der physischen Umgebung bestimmt werden. Auch wenn weitere Forschungsarbeiten erforderlich sind, um die Rolle dieser Faktoren in der Förderung von Verhaltensänderungen zu klären, ist zu hoffen, dass Forscher und Praktiker bei der Gestaltung von Programmen zu Förderung von Händewaschen in Zukunft Umweltaspekte und deren dynamisches Zusammenspiel mit sozial-kognitiven Determinanten in einem weitaus grösseren Ausmass betrachten werden, als dies bisher der Fall war.

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Chapter I

General introduction and overview of this thesis

1. Handwashing with soap as a key public health intervention

Diarrhoeal infections are among the most common causes of morbidity and mortality worldwide, especially among children under the age of 5 years (Liu et al., 2015). Even though deaths from diarrhoea in such children declined more than 50% from 2000 to 2013 (World Health Organization, 2015), an estimated 0.6 million children in this age range worldwide still died of diarrheal infections in 2013 (Liu et al., 2015). Diarrhoeal diseases remain among the leading causes of death behind preterm birth, birth complications, and pneumonia (Unicef, 2014). Apart from mortality, diarrhoeal infections can lead to long-term health consequences, such as malnutrition and cognitive deficits (Berkman, Lescano, Gilman, Lopez, & Black, 2002; Petri et al., 2008). Unsafe water, inadequate sanitation, and insufficient hand hygiene are important risk factors, particularly in low-income settings (Prüss-Ustün et al., 2014). It has been suggested that washing hands with soap at critical junctures, such as after defecation and before handling food, is one of the most effective public health measures to control the spread of infectious diseases (Cairncross et al., 2010; Ejemot-Nwadiaro, Ehiri, Meremikwu, & Critchley, 2008).

Pathogens causing diarrheal disease are usually transmitted by the faecal-oral route and are waterborne and water-washed diseases (G. F. White, Bradley, & White, 2002). Waterborne diseases are caused by ingestion of contaminated water, while water-washed diseases are favoured by inadequate use of water for domestic and personal hygiene. Almost all faecal-orally transmitted waterborne infections can also be transmitted through water-washed routes, including faecal contamination of fingers, food, fomites, field crops, or flies (Cairncross & Valdmanis, 2006). Water-washed faecal-oral diseases result from failure of water to wash away infectious pathogens and can be reduced by an increase in available safe water for proper maintenance of personal hygiene (G. F. White et al., 2002). Handwashing is considered a particularly important factor in the prevention of water-washed faecal-oral diseases (Curtis et al., 2003; Fewtrell et al., 2005). Contaminated hands may act as a vector for pathogens (Mattioli, Pickering, Gilsdorf, Davis, & Boehm, 2012), and increasing the amount of water used to rinse hands has been shown to reduce hand contamination (Hoque, 2003). Yet the prevalence of handwashing with soap at critical junctures remains remarkably poor, with rates as low as 13% to 17% in low- and middle-income regions (Freeman et al., 2014). Although great strides have been made in decreasing morbidity and mortality from diarrheal diseases, hygiene behaviour modification remains a key aspect of effective

infectious disease management. The success of recent efforts to promote handwashing behaviour in low-income settings is encouraging (Biran et al., 2014; Contzen & Mosler, 2015), but it is clear that effective approaches and strategies are still needed to increase handwashing with soap at critical junctures (Freeman et al., 2014).

Evidence suggests that health behaviour change interventions based on theory are more likely to be effective in modifying behaviour than those that do not utilize theory in developing message strategies (e.g., Baranowski, Lin, Wetter, Resnicow, & Hearn, 1997; Fishbein & Cappella, 2006; Glanz & Bishop, 2010; Painter, Borba, Hynes, Mays, & Glanz, 2008). Accordingly, interventions promoting handwashing with soap should be more effective when derived from theory and when addressing multiple ways of learning (Aboud & Singla, 2012; Al-Tawfiq & Pittet, 2013; Pittet et al., 2004). A thorough search of the relevant literature yielded only three studies reporting handwashing interventions in developing countries based on theory. Biran et al. (2014) used the Evo-Eco model (Aunger & Curtis, 2014) as a framework and considered the physical and social environments, existing behavioural routines, and fundamental human motivations associated with handwashing practice while developing a handwashing promotion campaign in rural India. Luby et al. (2010) based their intervention programme on the stages of change theory (Prochaska, Redding, & Evers, 2008), and Contzen, Meili, and Mosler (2015) selected their interventions by drawing on a baseline questionnaire study that applied Mosler's (2012) RANAS (risk, attitudes, norms, abilities, self-regulation) approach. All three studies reported significantly higher handwashing rates in intervention groups than in control groups at follow-up. Most importantly, all three studies used techniques to increase handwashing rates that went beyond awareness raising and knowledge acquisition. In order to optimise the effectiveness of health behaviour change interventions, scholars advocate the use of behavioural theories to guide programme development (Aboud & Singla, 2012; Al-Tawfiq & Pittet, 2013; Michie & Johnston, 2012). An important first step in developing effective health promotion interventions is understanding and predicting health behaviour (Bartholomew, Parcel, Kok, & Gottlieb, 2006; Kok, Schaalma, Ruiter, van Empelen, & Brug, 2004; Michie, Johnston, Francis, Hardeman, & Eccles, 2008). To explain and predict health behaviour, it is important to identify and understand factors that determine healthy behaviour.

2. Determinants of health behaviour

The following sections aim at identifying key determinants of human health behaviour. First, determinants from social-cognitive theories and their use are discussed. Then, broader approaches to predicting health behaviour and the behavioural determinants therein are considered. Finally, a theoretical framework is presented designed to provide a more comprehensive understanding of human health behaviour.

2.1. Social-cognitive determinants of health behaviour

A number of social-cognitive theories and models have been developed to understand and predict health behaviour (e.g., Conner & Norman, 2005). The health belief model (Rosenstock, 1966) is perhaps the oldest and most widely used social cognition model. The model hypothesizes that health-related action is a result of sufficient motivation or concern to make health a relevant issue, of perceived vulnerability to a health problem, and of the belief that following a particular health recommendation would be beneficial. Rogers's protection motivation theory (Rogers, 1975) is also based on expectancy-value theory and postulates protection motivation as the result of threat appraisal and coping appraisal. The appraisal of the health threat involves perceived severity and perceived personal susceptibility to the threat. The coping-appraisal pathway evaluates the perceived response efficacy of protective measures and perceived self-efficacy, the level of confidence in one's ability to perform the behaviour. Two major social-cognitive theories of health behaviour prediction include the theory of reasoned action (Ajzen & Fishbein, 1980) and the theory of planned behaviour (Ajzen, 1991). Both theories propose that intention is the main determinant of action. The theory of reasoned action outlines attitude and subjective norms as predictive of intention. The theory of planned behaviour extends the earlier theory by including the concept of perceived behavioural control, which influences the intention to act but can also predict behaviour directly. Perceived behavioural control reflects a person's confidence in their ability to carry out a behaviour successfully and is closely related to Bandura's (1982) construct of self-efficacy. In his social cognitive theory, Bandura (2004) posits that human behaviour is the product of the dynamic interplay of psychological determinants of behaviour, observational learning, environmental determinants of behaviour, self-regulation, and moral disengagement. His theory integrates a continuous interaction between cognitive and other personal factors, behaviour, and environmental events (Bandura, 1991). Cognitive and

personal factors are indexed by self-beliefs of efficacy, personal goal setting, and quality of analytic thinking. The environment comprises situation, roles, models, and relationships. In contrast to most social-cognitive models of behaviour change, which omit a temporal dimension, Prochaska and DiClemente's transtheoretical model of health behaviour change (1983) postulates that changing behaviour is a process over time and not a one-off event. In its most frequently used version, the model proposes that individuals attempting behaviour change move through five distinct stages: precontemplation, contemplation, preparation, action, and maintenance. The model describes how people move from being unaware, unwilling, or discouraged from making change, to considering the possibility, to becoming prepared and committed to changing their behaviour, and finally to taking action and maintaining the new behaviour (DiClemente et al., 1991). One of the most recent stage theories is the health action process approach (Schwarzer, 2008), which distinguishes between motivational predictors for intention formation and volitional predictors for behavioural change. Similar to the social cognitive theory, the health action process approach integrates several social-cognitive factors, including action self-efficacy, risk awareness, and outcome expectancies as predictors of behavioural intentions. The volitional phase is subdivided into a planning phase, an initiation phase, and a maintenance phase. It includes a planning construct which involves action planning, coping planning, and action control, and two different types of self-efficacy, maintenance and recovery.

2.2. The RANAS social-cognitive determinants of behaviour

The major social-cognitive theories outlined above show a number of important similarities and differences. Considering the substantial overlaps between these theories, several authors have proposed the adoption of a more integrative approach by combining constructs from competing theories into a more comprehensive model (Conner & Norman, 2005; Leventhal & Mora, 2008; Lippke & Ziegelmann, 2008). One attempt to overcome the restrictions of previous models is the risk, attitudes, norms, abilities, and self-regulation (RANAS) model of behaviour change (Mosler, 2012). The model integrates behavioural determinants from major social-cognitive theories in an effort to provide a more complete set of potential factors predicting behaviour. The RANAS social-cognitive determinants of behaviour are grouped into five blocks. Mosler (2012) considers all of these theoretically based determinants to be predictive of intention, behaviour, and habit strength.

The **risk** factors block distinguishes between the perceived susceptibility to contracting a condition and the perceived severity of the potential disease (Rosenstock, Strecher, & Becker, 1988). Additionally, people are more likely to engage in new behaviour if they have better knowledge about the symptoms of a disease, about how to contract a particular condition, and how to prevent it (Bandura, 2004).

Attitudes can be defined as the tendency to respond to the behaviour in a favourable or unfavourable manner (Fishbein & Ajzen, 1975). Attitudinal factors include affective beliefs, such as feelings that arise when performing or thinking of the behaviour, and instrumental beliefs, which refers to cognitive and judgemental aspects, such as opinions about costs in time or effort (Trafimow & Sheeran, 1998).

Social **norms** carry both a descriptive and injunctive function. Descriptive **norms** refer to the perception of how common a particular behaviour is, that is, an individual's impression of how many other people practice the behaviour (Park & Smith, 2007). A person's perception of the social approval of the behaviour by important others is called the injunctive norm (Cialdini, Reno, & Kallgren, 1990; Reno, Cialdini, & Kallgren, 1993).

The **ability** block is concerned with action knowledge: knowing how to perform a behaviour and different types of self-efficacy. Action self-efficacy can be defined as a person's expectations about their own competence and resources to successfully perform a behaviour (Bandura, 1991). Maintenance self-efficacy represents the belief in one's abilities to deal with barriers during the maintenance of a new behaviour, and recovery self-efficacy represents an individual's confidence in returning to the intended behaviour after a relapse (Schwarzer, 2008).

The fifth block comprises different aspects of **self-regulation**. Action control is a perceived self-regulatory process in which the actual behaviour is continuously evaluated with regard to a self-set standard (Schwarzer, 2008). Action planning can help initiate action through detailed planning of how, when, and where a behaviour will be performed, and coping planning can help a person overcome obstacles by anticipating potential barriers to performing the behaviour and planning responses accordingly (Sniehotta, Schwarzer, Scholz, & Schüz, 2005). Finally, to increase the probability of forming a habit, remembering an intended behaviour and being committed to implementing the new behaviour are essential prerequisites (Prochaska & DiClemente, 1982; Tobias, 2009).

Based on the social-cognitive determinants, Mosler's RANAS approach provides an analytical tool to analyse the determinants to be targeted by an intervention. The approach suggests to use quantitative data from surveys and to target the determinants with the highest intervention potential, that is, determinants with low mean scores and high predictive values on the behaviour within the target population. The approach provides specific behaviour change techniques for each determinant so as to develop appropriate intervention programmes.

2.3. Limitations of social-cognitive theories and models

Psychological or social-cognitive models of health behaviour have mostly focused on individual factors rather than on environmental or sociocultural influences (Abraham, Sheeran, & Henderson, 2011; Diez-Roux, 1998; Stokols, 1992b). Although increasing attention has been given to the role of contextual factors in health promotion (Stokols, Grzywacz, McMahan, & Phillips, 2003), the influences of socioeconomic status, policy, climate, and other measures of the social and physical environment are often excluded from social-cognitive models of health behaviour. Abraham et al. (2011) observe that this might partly be due to the small amount of variance that contextual factors explain at the level of individual behaviour and that their effects are mediated by cognitive factors. Moreover, factors influencing health behaviour are best measured at the individual level rather than at the group or macro level (Diez-Roux, 1998). Conner and Norman (2005) further argue that theoretical models for effective interventions tend to focus on social-cognitive factors as they are more amenable to change than, for example, personality factors or socioeconomic status. They consider social-cognitive determinants as most proximal to the behaviour; the effects of more distant environmental factors can best be explained through them. Yet even if contextual variables can explain far less of the variance in health behaviour than social-cognitive factors, they are theoretically significant because they can help elucidate how the sociocultural and physical environment shape cognitions and behaviour (Abraham et al., 2011; Liska, 1990). Many variables measured at the individual level are strongly influenced by the environment (Diez-Roux, 1998). On the other side, human beings do not just adapt to the environment or passively respond to environmental forces, they actively cope with and shape their environments (Gifford, Steg, & Reser, 2011). When looking at the physical environment in which behaviour takes place, individuals are geared to improve the built environment and dedicated to overcome difficulties and problems in the natural environment. Not including

contextual measures could result in an overestimation of the effect of social-cognitive factors on behaviour and in a failure to completely capture the complicated and subtle interactions between physical, sociocultural, and individual determinants of health behaviour (Cubbin & Winkleby, 2005; Riva, Gauvin, & Barnett, 2007; Williams, 1990; Zax & Rees, 2002). Social-cognitive models indeed provide valid and reliable measures and describe ways in which cognitions combine to determine health behaviours. They are the most proximal determinants of behaviour and can be used to inform the development of health behaviour interventions. However, ignoring the role of contextual variables at higher levels could lead to an incomplete understanding of the determinants of health in both individuals and populations (Diez-Roux, 1998; Susser, 1994). Thus, including both contextual and social-cognitive factors when developing interventions might lead to more effective health behaviour change programmes (Abraham et al., 2011; Lawman & Wilson, 2014; Mohajer & Earnest, 2010; Prins et al., 2010).

2.4. Ecological models of health behaviour

Developing models of disease causation integrating macro- and micro-level determinants, that is, the idea that factors operating at group or societal levels affect the health of individuals within them, is challenging. This is especially so if the model is to be meaningful and has the goal of explaining how social-cognitive, individual, and context variables jointly influence health behaviour (Diez-Roux, 1998). Ecological models of health behaviour have emphasized the influence of physical and sociocultural environments on personal health outcomes while incorporating psychological influences (e.g., Green, Richard, & Potvin, 1996; Grzywacz & Fuqua, 2000; McLeroy, Bibeau, Steckler, & Glanz, 1988; Stokols, 1992b). They explicitly consider multiple levels of influence with the final aim of developing more comprehensive health behaviour change interventions (Sallis, Owen, & Fisher, 2008). In the past two decades, ecological models of health behaviour have increasingly been applied to guide health promotion programmes because they encompass both environmental contexts and individual-level factors (Stokols et al., 2003). Central to the ecological approach is the awareness that behaviour is influenced by multiple levels, including biological, psychological, social, cultural, organizational, community, physical environmental, and policy (Golden & Earp, 2012; Sallis et al., 2008; Stokols, 1992b). Sallis et al. (2008) propose four core principles of ecological models, drawing on Stokols's (1992b) assumptions about the dynamics of human health: 1) factors at multiple levels affect specific health behaviours, often including

intrapersonal, interpersonal, organizational, community, and public policy levels; 2) influences on behaviours interact across these levels; 3) ecological models should be behaviour specific and identify the most important influences at the different levels; 4) interventions applied at multiple levels should be most effective in changing behaviour. The main purpose of ecological models is to inform the development of comprehensive health behaviour change interventions that involve different levels and strategies.

In contrast to social cognition models, ecological models emphasize the role of behaviour settings, the physical and social aspects of contexts in which behaviour takes place. As mentioned above, the narrow focus of social-cognitive models on cognitive processes does not sufficiently take into account the many influences of various contextual factors on behaviour. Numerous researchers have emphasized the role of context in understanding and influencing health behaviour (e.g., Glasgow, 2008; Kemm, 2006; Rychetnik, Frommer, Hawe, & Shiell, 2002). The development of effective interventions to increase handwashing with soap at critical junctures requires a proper understanding of the underlying social-cognitive and contextual behavioural determinants. Still, as Brownson, Fielding, and Maylahn (2009) observe, there is little consensus about what constitutes context. Dobrow, Goel, and Upshur (2004) state that when context moves from individual to population level it becomes more uncertain, variable, and complex. The authors acknowledge that it is virtually impossible to fully take account of all relevant contextual factors and that it would likely be of limited utility even if it were feasible.

Different scientific disciplines have proposed different definitions of the environment. Whereas natural scientists focus on the various biophysical aspects of the natural environment (e.g., geographers, hydrologists, soil scientists, etc.), social and behavioural scientists focus on human interactions with the environment (e.g., anthropologists, political scientists, psychologists, etc.). The challenge in applying an ecological perspective is to describe and conceptualize the complex social and natural environment. One such approach is Bronfenbrenner's ecological theory (1977), which envisions the environment as a nested arrangement of structures, including the microsystem of an individual, the mesosystem with its interrelations among major settings, the exosystem as an extension of the mesosystem, containing more distant social structures, and the macrosystem, which refers to the overarching institutional patterns of the culture. Another model designed to help explain human behaviour is the ecological model for health promotion by McLeroy et al. (1988), which views behaviour as determined by intrapersonal, interpersonal, institutional,

community, and policy factors. Interest in and use of ecological concepts and thinking in public health at the present time is due to an increasing acknowledgment of the complexity of public health problems, the limitation of models focusing on the individual level with linear and short causal chains, and the rediscovery of the inextricable relationship between context and health (McLaren & Hawe, 2005). There are a number of primary contributors to an ecological way of thinking in public health, including, among others, the aforementioned Urie Brofenbrenner and Kenneth R. McLeroy. In the following paragraphs, four recent models that embody an ecological perspective to health behaviour are presented in more detail: the social ecology model of health promotion (Stokols, 1992b), the Evo-Eco model (Aunger & Curtis, 2014), the integrated behavioural model for water, sanitation, and hygiene (Dreibelbis, Winch, et al., 2013), and the theory of triadic influence (Flay, Snyder, & Petraitis, 2009).

2.4.1. The social ecology model of health promotion

Ecological models of health behaviour emphasize the interaction between individuals and their environment. Among the most well-known conceptual models is Stokols's social ecological framework (1992b), which highlights the joint influence of the physical environment, multiple social dimensions, and personal attributes on the health status of individuals. Stokols (1992b) subsumes a variety of biogenetic, psychological, and behavioural processes under personal factors. Sociophysical environmental factors include different contextual facets, such as geographic, architectural, technological, and sociocultural factors influencing health. The author emphasizes the natural and artificial features of the physical environment. Geographic factors or natural features include climatic conditions, air pollution, traces of heavy metals, precipitation, and the quality and quantity of water sources. Architectural and technological factors, that is, artificial features of the environment, incorporate construction materials, design of environmental settings, and water quality and treatment systems. The multiple dimensions of the sociocultural domain include demographic, cultural, spiritual, religious, social, economic, legal, and political processes. Stokols's social ecology model of health promotion gives a very comprehensive overview of the different factors influencing the health status of individuals, listing various aspects of the physical environment, multiple social dimensions, and personal attributes. He does not, however, specify how these different factors influence behaviour, but rather states how health as a key outcome is affected by these factors alongside and together with different health-relevant behaviours.

2.4.2. The Evo–Eco model

Very recently, Aunger and Curtis (2014) introduced the Evo–Eco approach to behaviour change, a systematic means of classifying influences and drivers of human behaviour with roots in evolutionary biology, ecological psychology, and neuroscience. Their model is based on three fundamental elements acting within particular contexts: 1) the environment presenting challenges or opportunities to the individual, 2) the brain producing potential responses to the challenges, and 3) the body producing behaviour that changes the environment. The authors focus on triggers of change that are extrinsic to the person and divide the environment that influences behaviour into physical, biological, and social components. The physical environment includes infrastructure in the sense of a built environment consisting of modified aspects of the environment which remain durable when used, and it also includes technological objects that support and facilitate healthy behaviour. The biological environment is shaped by primary motives such as disgust, hunger, or fear, whereas the social environment consists of human relationships and social networks. Interactions of the environment, the brain, and the human body are important in understanding and inducing behaviour change as they happen in specific behaviour settings and are often routine behaviours linked to particular roles, objects, and contexts. In contrast to most social-cognitive models of health behaviour, the Evo-Eco model does not solely infer that behaviour is the result of expected utility and guided by beliefs about how likely it is that an outcome can be achieved. The underlying assumption of the model is that behaviour is often largely caused by environmental factors and automatic processes. The Evo-Eco approach has been successfully applied to develop a scalable handwashing promotion programme in rural Indian villages (Biran et al., 2014). The intervention showed substantial increases in handwashing with soap at critical junctures and was based on emotional drivers including nurture, disgust, affiliation, status, and habit. In contrast to Stokols's social ecology model of health promotion, the Evo-Eco approach focuses on how behaviour is determined by reality. Aunger and Curtis (2014) primarily view the person as a reacting organism in a determining environment, rather than conceptualizing the person as an actor. People adjust to the reality with all the different environmental influences, mainly with acquired automatisms. The authors view social-cognitive factors as secondary and do not get into the role of culture or society.

2.4.3. The integrated behavioural model for water, sanitation, and hygiene

Another attempt to create a model for designing and evaluating behaviour change interventions in infrastructure-restricted settings is the integrated behavioural model for water, sanitation and hygiene (IBM-WASH) of Dreibelbis, Winch, et al. (2013). The IBM-WASH model combines and integrates eight different models focusing on behaviours in the water, sanitation, and hygiene sector and organizes factors affecting behaviour in an ecological framework. The framework is divided into three dimensions (contextual, psychosocial, technological) at five aggregate levels (societal/structural, community, interpersonal/ household, individual, habitual), consistent with the matrices of ecological frameworks. The contextual dimension represents factors related to the individual and the environment, such as the age of an individual, access to water, and soap availability. The psychosocial factors include psychological, behavioural, and social determinants such as shared values, personal beliefs, and social norms, and the technological factors focus on the physical aspects and specific attributes of a technology that influence its adoption. The IBM-WASH model has been applied to the selection and application of a handwashing station in Bangladesh (Hulland et al., 2013). Seven different handwashing stations were tested by several households, with subsequent interviews guided by the IBM-WASH model. The selection of the best handwashing station was based mainly on technological factors, but also on psychosocial and contextual factors, and the best candidate is to be tested in a randomized controlled trial. The focus of the IBM-WASH model lies on the adoption of new technologies in the water, sanitation, and hygiene sector in developing countries. The individual cells of its matrix offer a sort of checklist to capture the full set of possible determinants when planning a behavioural intervention. Although certainly providing an extensive framework encompassing relevant determinants of health behaviour for designing behaviour change interventions in the water, sanitation, and hygiene sector, the model does not provide approaches to the measurement of the determinants across the three domains of the framework. The model moreover puts extensive focus on the characteristics of a technology, a dimension that could be subsumed under the contextual or, more specifically, the built environment. Furthermore, the model does not provide any information on how the complex interactions between psychosocial determinants and contextual factors might influence behaviour, but proposes that the framework be used as a kind of checklist to help decide what aspects of the psychosocial, contextual, or technological dimensions should be further looked into.

2.4.4. The theory of triadic influence

One model designed to provide practical guidelines to understanding influences on health behaviour and thus to developing effective health promotion programmes is the theory of triadic influence (Flay et al., 2009). This theory is one of the most comprehensive models of behaviour to date and combines many other theories of health behaviour into a single unifying framework. Flay et al. (2009) arranged potentially relevant factors in a conceptually meaningful way along two dimensions: levels of causation (from distal to proximal predictors) and streams of influence (personal, social, environmental). The theory of triadic influence asserts that causal effects flow within three distinct streams of influence through different levels of causation, converging on behavioural intentions, which initiate trial behaviours and finally the behaviour itself. The personal stream begins with relatively stable biological predispositions and personality characteristics which directly affect social and personal nexus variables, including views of one's self and social competence. At the next level, this sense of self and these general competencies influence a person's own will and perceived skills, which then converge on self-efficacy and behavioural control. The social stream affects behavioural intentions through distal variables comprising a person's immediate social surroundings, through the strength of interpersonal bonds and role models, to the more proximal influencing predictors, motivation to comply and perceived norms. Finally, social influences result in a person's social normative beliefs regarding a specific behaviour. Lastly, the environmental stream converges on attitudes toward a behaviour by passing through the broad cultural environment, interactions with social institutions, information gathered from the cultural environment, and through the valuation of, knowledge about, and expectations regarding the behaviour. As in Ajzen's (1991) theory of planned behaviour, the most proximal predictors of behavioural intentions are self-efficacy, social normative beliefs, and attitudes towards a behaviour. Each of the three major streams of influence includes two sub-streams, one cognitive and rational and the other affective and emotional. The authors also recognize that influences in one path are often mediated by or moderate influences in another path. The model can easily be applied to all types of behaviour and gives a comprehensive overview of opportunities for interventions. It implies that health promotion programmes could target one, two, or all three streams of influence and position an intervention at one or more levels of causation. In contrast to the other presented models, the theory of triadic influence emphasizes the role of social-cognitive variables, or rather their position relative to the behaviour. Nonetheless, whereas the theory of triadic influence stresses the proximal influence of individual-level social-cognitive determinants on

behaviour, the physical environment and how it influences behaviour was not explicitly mentioned. Moreover, the theory of triadic influence is a fairly complex model and may not be clear or useful to practitioners.

2.5. Health behaviour framework

Despite the wide range of theories and models available that predict intentions and behaviour, their use in explaining health behaviours and in designing behaviour change programmes in developing countries is still rare. As Stokols (1992a) rightfully states, research in the field of health psychology has placed greater emphasis on the role of social-cognitive factors, whereas environmental psychology has given greater emphasis to the role of the sociophysical environment. Research which takes into account the physical, social, individual, and social-cognitive aspects of behaviour and their interactions is limited (Stokols, 1992a). The four models presented use a broader ecological model approach which positions individual behaviours within a multi-level causal framework. Each of the models offers valuable theoretical and conceptual determinants of health behaviour. However, each of the models provides only a limited framework for understanding the way the environment shapes health behaviour. A framework is proposed in this thesis to overcome these limitations by combining psychological and ecological perspectives and by acknowledging the interconnectedness and interdependence of contextual and social-cognitive determinants of behaviour, all the while keeping it simple and parsimonious. The notion of context is used in the broadest sense of the word, including physical and social aspects of context as well as attributes of persons within (McLaren & Hawe, 2005). An overview of the framework is displayed in Figure 1.

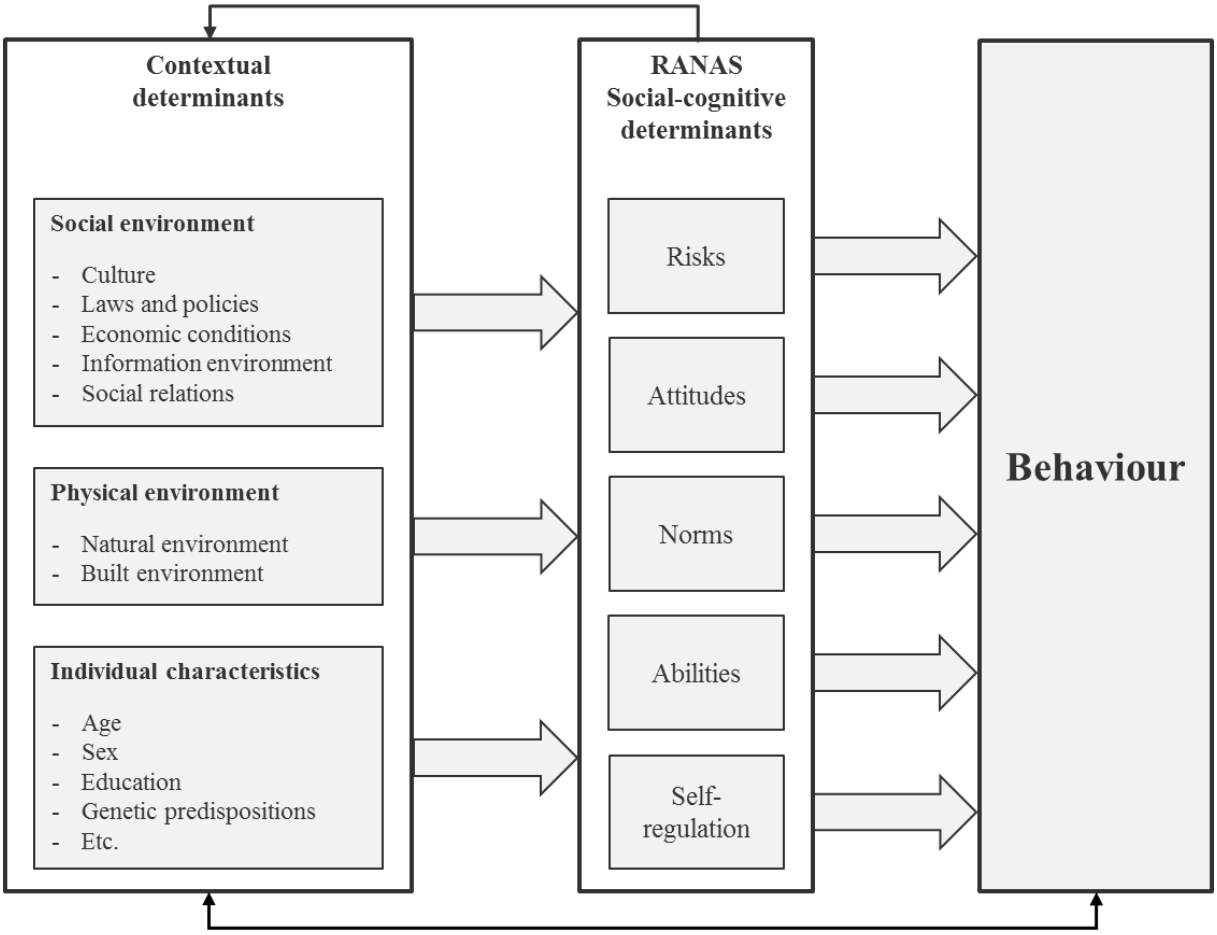

Figure 1. Health behaviour framework.

Going back to the four core principles of ecological models (Sallis et al., 2008; Stokols, 1992b), the framework for health behaviour used in this thesis assumes, first, that health behaviour is influenced by multiple facets of the physical environment, including the natural and built environment (e.g., climate, buildings, infrastructure), the social environment (e.g., social relations, culture, economic conditions), and characteristics of the individual (e.g., level of education, age, gender). Second, dynamic interactions among environmental factors and individual characteristics are implied in this framework, and their influences on and responses to social-cognitive determinants of behaviour set forth. Third, the framework is applied to the specific prediction of handwashing behaviour in household and school settings in developing countries and the thesis discusses the most important influences at different levels across the various environmental factors and individual characteristics on handwashing. Fourth, the framework allows a better design of interventions operating at multiple levels, thus maximizing their effectiveness by considering the various physical, social and individual features affecting handwashing behaviour.

Because of the aforementioned encompassing set of behavioural determinants of the RANAS model, the factor blocks of the RANAS model were used to account for the social-cognitive factors that affect behaviour (see Figure 1). Within the framework, the social-cognitive and contextual determinants may influence handwashing behaviour through various, potentially additive and interactive ways. As in the theory of triadic influence (Flay et al., 2009), the factors are arranged by different levels of causation. The social-cognitive variables have direct effects on behaviour and are causally more proximal or immediate, whereas the effects of contextual determinants are mediated through the social-cognitive factors and are more causally distal. In the following sections, the different factors influencing health behaviour identified in the proposed framework are discussed with regard to their documented influence on handwashing practices in infrastructure-restricted settings in developing countries.

3. Determinants of handwashing behaviour

Studies reporting social-cognitive and contextual determinants of handwashing practices have mostly been carried out among healthcare workers (Curtis & Cairncross, 2003). Empirical evidence identifying the determinants of hand hygiene compliance among staff in healthcare settings is clearly not generalizable to the population of adults, much less to caregivers of young children in developing countries or to young children themselves. The studies discussed here were conducted in developing countries to understand handwashing behaviour of adults and young children. Most studies have concentrated almost exclusively on caregivers of children below the age of 5 years, as they are primarily responsible for food preparation, child care, and child rearing. A few studies have been conducted in school settings with a limited number of studies investigating social-cognitive determinants of children's handwashing practices. The goal of these sections is to explore and describe the role of the determinants specified in the proposed health behaviour framework in predicting handwashing behaviour. An overview is presented of what research has been conducted into the impact of the RANAS social-cognitive determinants on handwashing behaviour and of what contextual determinants have been examined in conjunction with handwashing practices in infrastructure-limited household and school settings in developing countries.

3.1. The RANAS social-cognitive determinants of handwashing behaviour

Research examining the social-cognitive determinants of handwashing practices in developing countries is limited. There is some qualitative evidence and limited quantitative evidence of how social-cognitive determinants explain and predict handwashing practices in developing countries. Although the most important critical junctures at which to wash hands have not yet been clearly defined (Freeman et al., 2014), most research focuses on handwashing as a primary barrier to pathogen transmission by removing faecal matter after contact with stool and handwashing as a secondary barrier to pathogen transmission by washing hands before preparing or handling food (Curtis, Cairncross, & Yonli, 2000). The critical junctures for washing hands with soap most often studied are thus after defecation, after wiping a child's bottom, before preparing food, before handling drinking water, before feeding a child, and before eating. In the following paragraphs, the RANAS social-cognitive determinants included in the proposed framework are discussed with regard to their implications in explaining handwashing practices at critical junctures in behaviour-restricted settings in developing countries.

3.1.1. Risk perception

The first factor block of the RANAS model includes beliefs about the severity of contracting the disease, beliefs about personal vulnerability to diarrhoea, and knowledge about the cause and transmission of the disease. In a study using the RANAS model to identify behavioural determinants of handwashing in Ethiopia, Contzen and Mosler (2015) found **perceived severity** of contracting diarrhoea to be among the best predictors for both food- and stool-related handwashing. On the other hand, the authors could not find the same predictive value for perceived severity in a similar study conducted in Haiti. With regard to **perceived vulnerability**, in a review of formative research on handwashing in eleven countries, Curtis, Danquah, and Aunger (2009) found that the fear of contracting an infectious disease was generally not a motivator for washing hands with soap at critical junctures, although they acknowledged that the threat of a severe or epidemic disease might motivate handwashing with soap temporarily. In a study conducted in Kenya, Aunger et al. (2010) found that a concern with cleanliness was strongly associated with observations of soap use after contact with faeces, but not before contact with food. Two of the five statements loading on that factor were beliefs related to fear of contracting a disease, supporting the assumption of Scott, Curtis, Rabie, and Garbrah-Aidoo (2007) that perceived vulnerability may have predictive value for handwashing behaviour in developing countries. Interestingly, in a study conducted

in Senegal (Devine, Karver, Coombes, Chase, & Hernandez, 2012), the perceived threat from not washing hands with soap was negatively associated with having a designated location to wash hands with soap, which was used as an indicator of handwashing practices. The authors assume that not having a handwashing facility and thus not regularly washing hands might have been the reason for the fear of contracting a disease. Finally, **knowledge** about the causes of a disease, its consequences, and its prevention is commonly mentioned in studies of handwashing behaviour. A report of a hygiene and sanitation initiative in India stated that participants with better knowledge of the critical junctures at which to wash hands were more likely to have better handwashing skills and that knowledge was related to the availability of soap and water near the latrine (Mathews & Kumari, 2004). A soap promotion and hygiene education campaign on handwashing behaviour in rural India was able to increase reported knowledge of germs; however, no effect of actual handwashing behaviour at critical junctures could be found (Biran et al., 2009). In their review of formative research on handwashing, Curtis et al. (2009) concluded that knowledge about germs might be too abstract a concept and the causal chain of belief about diarrhoea too long to be an immediate motivation to engage in handwashing behaviour. In school settings, a study on school children's handwashing knowledge and practice in Malawi also showed that, although children were well aware of the importance of washing hands after using the latrine, they seldom practised the behaviour at school (Grimason et al., 2014). Many studies have focused on risk factors when trying to understand handwashing behaviour. The results indeed suggest that risk factors play an important role. However, emerging evidence suggests that other social-cognitive determinants might play a more important role in initiating handwashing behaviour (Contzen & Mosler, 2015; Curtis et al., 2009).

3.1.2. Attitudes

Attitudes are differentiated into affective and instrumental beliefs. **Affective beliefs** refer to expectations about how washing hands with soap at critical junctures would make one feel, whereas **instrumental beliefs** are determined by beliefs about the advantages or disadvantages of washing hands. Curtis et al. (2009) found that disgust at having dirty or contaminated hands, the motivation of mothers to nurture their children and teach them handwashing, and the desire to look attractive for their husbands and others were motivators for handwashing. Aunger et al. (2010); Scott, Curtis, et al. (2007) and the Steadman Group (2007) were able to verify these findings as determinants of actual handwashing behaviour, especially with soap use observed after contact with faeces. Aunger et al. (2010) and the

Steadman Group (2007) also found economic concern, that is, high concern about the cost of soap critical junctures to be an inhibitor for handwashing. Contzen and Mosler (2015) found disgust to be a good predictor for both food- and stool-related handwashing in Haiti and Ethiopia, whereas nurture only had predictive value among caregivers in Ethiopia. The same authors categorize the perceived health advantages of handwashing and the time and monetary costs as instrumental beliefs. They found instrumental beliefs to enhance food-related handwashing practices in Haiti, but not in Ethiopia. In Peru, affective and instrumental beliefs proved to be significantly correlated with having a handwashing station with soap and water (Devine et al., 2012). In school settings, Lopez-Quintero, Freeman, and Neumark (2009) and Setyautami, Sermsri, and Chompikul (2012) also found that school children who expressed positive attitudes toward proper handwashing were several times more likely to report positive intentions to wash hands with soap than students with negative attitudes. As to the relevance of attitudes when trying to explain handwashing behaviour, several researchers have stated attitudes, especially affective beliefs, such as disgust and nurture, to be key determinants of handwashing behaviour among caregivers in developing countries (Aunger et al., 2010; Curtis et al., 2009; Scott, Curtis, et al., 2007; Steadman Group, 2007).

3.1.3. Social norms

Research into the determinants of handwashing behaviour has identified social norms, that is, beliefs about how commonly a behaviour is practised and whether it is approved by others, as key factors that influence handwashing behaviour. The **descriptive norm** is the extent to which others are perceived to perform the behaviour or not. The **injunctive norm** is determined by a person's beliefs about whether important referents approve or disapprove of them washing hands with soap and water at critical junctures. Devine et al. (2012) explored social norms specifically through descriptive norms and reported them to be a good indicator for the presence of a designated location for washing hands with soap and water among caregivers in Senegal. Scott, Curtis, et al. (2007) listed social concerns, desires to be accepted by and to gain status in society, as a key behavioural driver of handwashing. Likewise, Curtis et al. (2009) stressed the importance of the perception of what everyone else does and of what other people feel one should do. Contzen and Mosler (2015) combined the descriptive and the injunctive norms in their analyses and found norms to be among the best predictors for food- and stool-related handwashing practices among caregivers in both Haiti and Ethiopia. Among children as well, willingness to comply with expectations of parents, classmates, and teachers regarding handwashing was significantly associated with positive intentions to wash hands

before eating and after using the toilet (Lopez-Quintero et al., 2009). Social norms may thus be an important construct in the effort to enhance handwashing behaviour.

3.1.4. Abilities

An indispensable determinant of the ability block of the RANAS model is **action knowledge**, that is, knowledge about how to perform a behaviour. Devine et al. (2012) found knowledge of the best way to wash hands to be a significant predictor of a designated location to wash with soap. **Self-efficacy** refers to perceptions of one's ability to perform handwashing behaviour successfully at all critical junctures and proved to be a key predictor for handwashing behaviour at food- and stool-related critical junctures in Ethiopia and Haiti (Contzen & Mosler, 2015). The authors also found that impediments, the feeling of being hindered in handwashing by barriers and distractions, to be crucial for both types of handwashing, confirming previous research on handwashing showing the importance of readily accessible agents for washing hands at a convenient place (Devine et al., 2012; Luby, Halder, et al., 2009). The two studies by Contzen and Mosler (2015) are the only ones to have investigated the impact of self-efficacy on handwashing behaviour among adults. Their results show a strong role of self-efficacy in the prediction of handwashing practice, confirming findings from studies on hand hygiene in health care settings (e.g., Jenner, Watson, Miller, Jones, & Scott, 2002; O'Boyle, Henly, & Larson, 2001; von Lengerke et al., 2015; Whitby et al., 2007) and among college students (Lhakhang, Lippke, Knoll, & Schwarzer, 2015). In school settings, Lopez-Quintero et al. (2009) and Setyautami et al. (2012) also found that school children with high perceived behavioural control, which is similar to self-efficacy, were more likely to report high intentions or high rates of performing proper handwashing.

3.1.5. Self-regulation

Apart from Contzen and Mosler (2015), who applied the RANAS model to investigate social-cognitive determinants of handwashing behaviour among caregivers in Haiti and Ethiopia, the literature has not revealed other studies examining the role of self-regulation factors on handwashing practices in developing countries. **Coping planning**, anticipating barriers that might hinder handwashing performance with suitable coping responses, proved to be among the best predictors for food- and stool-related handwashing behaviour, as was the commitment to always washing hands at critical junctures. Distraction and **forgetting** were mentioned as barriers in a study exploring the cognitive determinants of hand hygiene among health-care workers (K. M. White et al., 2015). Forgetfulness due to slow adaptation to a new behaviour

and the many junctures for handwashing has also been mentioned in a study conducted in Uganda (Steadman Group, 2007). Indeed, forgetting is expected to be a common barrier to a routine behaviour such as handwashing, as the salience of reminders might decay before a habit has been developed (Tobias, 2009). However, a person's **commitment** to performing the behaviour can increase the reminding effect of events and cues (Tobias, 2009). Even though little research has been done to investigate the role of self-regulatory strategies in initiating and sustaining handwashing practices, findings from other studies on the determinants of hygiene behaviour in developing countries suggest that **action planning** and coping strategies (Inauen, Hossain, Johnston, & Mosler, 2013; Inauen & Mosler, 2014; Tumwebaze & Mosler, 2014) as well as commitment (Inauen, Tobias, & Mosler, 2014; Tumwebaze & Mosler, 2014) might be relevant predictors.

3.2. Contextual determinants of handwashing behaviour

The contextual determinants within the proposed framework in this thesis subsume factors of the social environment, the physical environment, and individual characteristics. The attention they have received in the handwashing literature is discussed in the following sections.

3.2.1. Social environment

As suggested in the proposed framework, the social environment includes cultural, political, economic, and social characteristics of the social structure beyond the level of the individual that both constrain and motivate individual choices. The cultural environment represents a major component of the environmental influence on behaviour and refers to the set of beliefs, moral values, traditions, language, norms, and symbols held in common by the members of a society. The political environment includes laws, regulations, policies and institutional rules. Economic conditions are governed by the economic development, poverty and income distribution within a society. The information environment refers to environment elements that directly or indirectly affect behaviour and to which people have access through information resources and technology within an information culture. Social relations represent the quality of relationships and interactions between individuals or groups within society.

3.2.1.1.Culture

In a formative research study on hygiene practices in rural Kyrgyzstan, Biran, Tabyshalieva, and Salmorbekova (2005) reported the relevance of beliefs in when it is important to wash hands with soap. Respondents listed different times during the day, for example in the

morning after getting up and in the evening before going to bed, or after dirty work, before making bread, before eating, and after using the latrine; early morning was widely mentioned as the most important time for washing hands with soap. Washing hands before making bread, for instance, is seen as respect for bread in the local culture, and cleanliness in general is valued as a cultural norm. Other authors have reported the same finding for countries in sub-Saharan Africa, where soap is used primarily to remove visible dirt from hands and the pleasant smell of soap was reported as a motivation to use it (Curtis et al., 1997; Kaltenthaler & Dražar, 1996). In a study investigating the role of media exposure on handwashing practices, Schmidt et al. (2009) found that education and wealth alone did not explain the association between media exposure and handwashing. The authors concluded that owning a TV, radio, postal address, or e-mail address and using them might be an indicator for wanting to be modern and for wanting to improve social status, a tendency that had previously been identified as a predictor for hygiene behaviour (Curtis et al., 1995). Schmidt et al. (2009) also stated that religious affiliation may influence handwashing behaviour, as areas with a high proportion of Muslims showed high handwashing rates. Datta et al. (2011) reported that Christian mothers were more likely to practice better handwashing and Seksaria and Sheth (2014) found that the religion of the family was associated with diarrhoeal diseases. Kaltenthaler and Dražar (1996) stated that both traditional beliefs and modern lifestyles strongly shape hygiene behaviours and that it is crucial to understand cultural norms and values when developing health education intervention programmes.

3.2.1.2.Laws and policies

Advocacy for water, sanitation, and hygiene issues, including the promotion of hand hygiene, is one of the recommended solutions of Gill et al. (2013) to childhood morbidity and mortality from diarrhoea and pneumonia. Although advocacy for handwashing that targets policy makers and key stakeholders to change or influence policies and practices could help, very few scientific studies have investigated how laws and policies affect handwashing behaviour and how they might be changed. For example, Scott, Curtis, et al. (2007) reported that over half of a study population in Ghana paid for water from public facilities, a situation that is encountered in many sub-Saharan countries in Africa, including Burundi. Moreover, the volume of water used by households depends on accessibility, which is primarily determined by distance and time but also by reliability and cost (G. Howard & Bartram, 2003). Different levels of service result in different quantities of water collected, increasing the risk of waterborne diseases through contaminated domestic water supplies and increasing the risk of water-washed diseases due to insufficient amounts of water for personal hygiene (G. Howard

& Bartram, 2003). Similarly, primary schools benefit from favourable policies in water supply and sanitation service with an emphasis on ensuring availability of soap for handwashing. Primary barriers to adequate handwashing in primary school settings in developing countries include inadequate access to water, lack of handwashing facilities, and the costs of providing sufficient soap (e.g., Grimason et al., 2014; Monney, Bismark, Isaac, & Yaw, 2014; Steadman Group, 2007). Indeed, lack of supplies and facilities for handwashing have been reported to be due to the financial constraints of school budgets, uncoordinated activities by the ministries in charge, and lack of interaction between the school committee, schoolteachers, and local health workers (Grimason et al., 2014). Schools that have been able to successfully sustain school handwashing programmes in Kenya had a high level of institutional support and budgeted for supplies and activities, and the school management committees were reported to be active in purchasing handwashing supplies and carrying out programme-related activities (Saboori et al., 2013).

3.2.1.3.Economic conditions

Many studies have evaluated the influence of socioeconomic status on handwashing practices in developing countries, especially since soap purchase has frequently been mentioned as one of the major barriers to regular handwashing with soap (e.g., Biran et al., 2005; Scott, Curtis, et al., 2007; Zeitlyn & Islam, 1991). Low handwashing rates might be due to the living conditions associated with poverty and poor water and sanitation infrastructure (Biran et al., 2005). Luby and Halder (2008), for example, found that both reported and observed indicators of handwashing with soap, such as the presence of soap next to the handwashing location, the presence of a convenient handwashing location with water, or the amount of money spent on soap were closely associated with household wealth in Dhaka, Bangladesh. Likewise, in rural Bangladesh, Luby, Halder, et al. (2009) found that washing both hands with soap after contact with stool was higher among the wealthiest households, and Halder et al. (2010) observed that hand cleanliness was associated with household wealth. In rural Kenya, Kamm et al. (2014) found that the likelihood of having a specific soap for personal cleansing or more than one type of soap was highest in the wealthiest households, whereas households without soap were more likely to be in the lower wealth quintiles. In a rural village in the Philippines, Sakisaka, Wakai, and Wongkhomthong (2002) found that handwashing with soap after defecation was associated with the possession of a private well, a private latrine, and electricity in the household. Similarly, Schmidt et al. (2009) assessed whether people had a TV, radio, postal address, or e-mail address, and whether they were exposed to media, including newspaper, radio, TV, and movies. The authors found that handwashing increased with every additional

item in both categories and expressed little doubt that media use and access were markers of a household's socioeconomic status. In school settings, funds available for recurrent costs are mentioned as a barrier to providing adequate handwashing facilities and supplies for all students to regularly wash their hands with soap and water (Patel et al., 2012; Saboori et al., 2011). In spite of all this evidence, the direct relationship between a high socioeconomic status and handwashing behaviour remains difficult to interpret, especially because most studies are cross-sectional and do not examine possible confounding variables such as education, religion, and social class.

3.2.1.4.Information environment

Schmidt et al. (2009) were able to demonstrate that exposure to media plays a role in the formation of hygiene behaviours. Nationwide promotion of handwashing via mass media during cholera outbreaks were thought to partly explain this association between media exposure and handwashing. A study conducted in Ghana found that TV and radio commercials had greater reach and impact on reported handwashing than community events, while mass communication combined with community events produced the greatest impact (Scott, Schmidt, Aunger, Garbrah-Aidoo, & Animashaun, 2008). Both studies confirmed the importance of the information environment to health behaviour but underscore the use of a variety of complementary channels due to the failure of mass media to reach the entire target population and in particular lower socioeconomic groups. In their review of formative research findings, Curtis et al. (2009) stated that mass media coverage is growing, with radio coverage being the most extensive, but that handwashing with soap rarely featured in the media. In a follow-up study highlighting the difficulties of maintaining improved handwashing behaviour after a handwashing promotion campaign, the authors concluded that maintaining the new behaviour is not guaranteed when promotional activities are withdrawn (Luby, Agboatwalla, et al., 2009). The authors suggest that maintaining effective handwashing behaviour requires focused efforts and research on optimal strategies, enhancing the importance of a rich and active information environment.

3.2.1.5.Social relations

The behaviour of individuals is affected not only by their personal characteristics but also by characteristics of the social groups to which they belong and the relations they have developed. Social norms have long been shown to affect the behaviour of individuals (e.g., Asch, 1955; Cialdini et al., 1990). Curtis et al. (2009) mentioned the importance of social interactions with family, neighbours, local social organizations, and health workers in

influencing the handwashing behaviour of caregivers of young children. Findings from Zimbabwe suggest that altering the norms of a community and developing strong community structures in support of hygiene behaviours can positively influence key hygiene practices, including handwashing (Waterkeyn & Cairncross, 2005). Schmidt et al. (2009) also found that participating in social activities, such as parents' association meetings, road shows, church, public meetings, and going to restaurants was positively correlated with handwashing. Curtis et al. (1995) found that mothers who had attended large numbers of health education sessions showed improved hygiene behaviour. In addition to the direct influence of health education on behaviour, the authors assume that mothers might also want to improve their social status. In primary school settings, Pickering, Blum, Breiman, Ram, and Davis (2014) found a positive effect of peer influence on students' handwashing compliance. Even the presence of at least one other person at the handwashing station increased student handwashing rates at all enrolled schools. Moreover, the study showed that handwashing rates increased proportionally with the number of additional people observed close to the handwashing station. Higher rates of handwashing in the presence of others might be an indicator for an established social norm to wash hands. Other studies have concluded that, besides a lack of facilities and supplies, children's low compliance with handwashing might be due to the fact that teachers do not actively emphasize the importance of washing hands with soap (Grimason et al., 2014; Steadman Group, 2007). The positive influence of peer pressure on students' hand hygiene practices, the importance of teachers in supporting and encouraging handwashing behaviour, and the repercussions of participating in social activities emphasize the role of social relations in creating and maintaining hygiene behaviours.

3.2.2. Physical environment

The inaccessibility of hand hygiene resources has been identified as a key barrier to proper and regular handwashing performance in developing countries. Most studies investigating the facilitating role of an appropriate environment have focused on what is regarded as the built environment that is amenable to change. Commonly found structural constraints include a lack of adequate and appropriate handwashing facilities along with a lack of handwashing agents including soap and water.

3.2.2.1.Built environment

Soap observed beside the latrine or at the handwashing location has been found to be associated with higher rates of handwashing (Biran et al., 2008; Dobe, Mandal, & Jha, 2013; Luby, Halder, et al., 2009; Steadman Group, 2007), and improved hand cleanliness (Halder et

al., 2010). Behaviour trials have been able to show that providing soap to participants resulted in increased handwashing with soap at critical junctures (Biran et al., 2005). Luby and Halder (2008) were also able to show that the farther away the handwashing location was from the house, the less likely it was that soap was available, whereas a location to wash hands within the house was strongly associated with the presence of soap. In addition to the barrier of soap affordability, Scott, Curtis, et al. (2007) and Luby and Halder (2008) reported that finding a safe and suitable place to store soap was also a problem. Respondents expressed concern that neighbours or children might waste or steal the soap, which resulted in soap being stored at less convenient and accessible places. The presence of water at the most convenient place to wash hands has been found to increase the likelihood of handwashing with soap after contact with stool, as observed in structured observations (Luby, Halder, et al., 2009; Steadman Group, 2007), and increased the likelihood of having less contaminated hands (Halder et al., 2010). Mothers have been observed to wash their hands more often in compounds with a tap than in compounds without (Curtis et al., 1995; Scott, Curtis, et al., 2007), and the ownership of a private well was a significant predictor of washing hands with soap and water after using the toilet (Sakisaka et al., 2002). Having a water source in the house rather than in the household compound influenced the likelihood of handwashing at critical junctures (Schmidt et al., 2009). Similarly, handwashing practices were found to be more prevalent among Indian adolescents with in-house water supplies than among their peers using other water sources (Dobe et al., 2013). Gilman et al. (1993) observed families' handwashing practices and found that families that used more total water interrupted faecal contamination by hand washing more often. Indeed, the volume of water supply has been identified as a significant predictor of hand-washing with soap (Sakisaka et al., 2002), and households with in-house water supplies use greater quantities of water for hygiene activities such as bathing and handwashing (G. Howard & Bartram, 2003). Having plentiful amounts of water so as always to be able to wash hands with soap at critical junctures is more likely when water is easily accessible (Cairncross & Feachem, 1993; Sakisaka et al., 2002). Conversely, qualitative data suggested that water shortage may present a barrier to handwashing (Scott, Curtis, et al., 2007). Having a washstand was associated with significantly higher rates of handwashing following latrine use (Biran et al., 2005), a result confirmed in an eleven-country review, which concluded that a major environmental constraint to washing hands with soap after using the toilet was not having a specific location at which to do so (Curtis et al., 2009). Taken together, evidence suggests that if there is no designated location to wash hands at household level and if soap and water are not readily and conveniently accessible when

needed, handwashing with soap is less likely to occur at critical junctures. In a systematic review on water and sanitation in schools, Jasper, Le, and Bartram (2012) concluded that children in schools are also less likely to wash hands with soap and water with scarce supplies for handwashing. Inaccessibility of handwashing facilities at school does not allow children to practise proper handwashing after using the latrine (Steadman Group, 2007; Yalçın, Yalçın, & Altın, 2004). Indeed, most school children observed did not practise proper handwashing with soap due to the lack of appropriate handwashing facilities, including soap and clean running water (Steiner-Asiedu et al., 2011). Programmes providing handwashing containers have been able to show an increase in scores on a handwashing demonstration (Blanton et al., 2010; Freeman et al., 2012; Patel et al., 2012). In schools that received powdered soap and plastic bottles to make soapy water, a greater proportion of children were observed washing their hands after latrine use compared to control schools (Caruso et al., 2014). Moreover, in schools receiving soap, more students were observed practising handwashing with soap after latrine use than children from control schools that did not receive any intervention (Saboori et al., 2013). Likewise, lower rates of overall illness and absence were reported in schools receiving soap than in schools that only received a handwashing-promotion programme (Bowen et al., 2007). Not only do the presence of supplies and facilities influence school children's handwashing behaviour, but the placement and design of such facilities also affect whether and how often children wash their hands at school (Grimason et al., 2014). Zhang, Mosa, Hayward, and Matthews (2013) were able to show that tippy taps, handwashing stations with a container of water and a foot pedal to control water flow, along with the provision of soap can increase handwashing rates among primary school children.

3.2.2.2.Natural environment

Natural environment factors affecting handwashing such as climate or water availability have not been the focus of many studies investigating determinants of handwashing with soap. The studies that have included natural environment factors in determining handwashing practices mostly addressed water accessibility. Indeed, effective hand hygiene practices rely on access to convenient water supply (G. Howard & Bartram, 2003). If the time spent collecting water exceeds 30 minutes, domestic water use declines, and if households are connected to a piped water system, the amount of water used increases dramatically (Cairncross & Feachem, 1993). A water project decreasing distances to water sources resulted in increased water quantities at household level, permitting more washing of hands (Peter, 2010). A cross-sectional survey from the Philippines found that handwashing with soap after defecation was higher among those who had to walk less than three minutes to reach the water source

(Sakisaka et al., 2002). However, Omotade, Kayode, Adeyemo, and Oladepo (1995) reported no association between distance from the household to the water source and handwashing practices. The authors concede that this lack of a significant association might be due to their distance breakdown into less than 1 km versus more than 1 km, which may not have been enough to detect an effect of the time spent collecting water on handwashing practices. Still, facilitating access to water, that is, building appropriate water supply systems, might help overcome the long water collection journeys set by the natural environment.

Two studies have reported effects of climate on handwashing practices. In a formative research study conducted in Kyrgyzstan, respondents stated that cold temperatures might discourage handwashing during the winters, especially in the mornings (Biran et al., 2005) and Schmidt et al. (2009) reported that water scarcity hardly influenced handwashing practices except during very prolonged periods of water scarcity. A sustainability evaluation of an intervention programme providing point-of-use drinking water treatment along with drinking water and hand-washing water storage containers to 55 primary schools in Kenya revealed that the most common criterion met was water provision (Saboori et al., 2011). Over 90% of the schools were within 1 km of their primary water source during the rainy season; that number decreased to 71% during the dry season. When the distance to the water source was beyond 0.5 km, provision of handwashing water tended to decrease. Even though few studies have investigated the influences of natural environment conditions such as climate or access to water on handwashing practices in developing countries, the consistency within literature of reported positive hygiene outcomes for households and schools with improved access to water suggest that increased proximity to a water source may encourage safe handwashing behaviour.

3.2.3. Individual characteristics

Individual characteristics refer to individual differences in various aspects, such as education, gender, age, or genetic predispositions. Few studies have investigated the influence of personal attributes on handwashing practices in infrastructure-restricted settings and if so, they mostly focused on education and to a lesser extent on age and gender.

3.2.3.1.Education

Education has often been found to be a factor associated with high rates of handwashing with soap. Asekun-Olarinmoye, Olubukola, Adebimpe, and Asekun-Olarinmoye (2014) reported that mothers with higher educational levels demonstrated better knowledge and practice of

hand washing. Similarly, Datta et al. (2011) found that mothers with higher education status reported better handwashing practices. In Kenya, Schmidt et al. (2009) were able to observe more handwashing with soap at critical junctures among primary caregivers who had higher levels of education and literacy, findings that are in line with the results reported by Luby, Halder, et al. (2009) from Bangladesh. They found that if the mother of the youngest child had education above the primary level, higher rates of handwashing with soap after contact with stool were observed in the household. Furthermore, Gilman et al. (1993) found an association between the total amount of water used by a family and the mother's education, corroborating the findings from several studies that reported higher education to be associated with better handwashing practices among adults in the Philippines and China (Sakisaka et al., 2002; Tao, Cheng, Lu, Hu, & Chen, 2013).

3.2.3.2.Gender / Age

Most studies have focused on female caregivers when investigating hand hygiene practices in developing countries. Nonetheless, the few studies that included male participants have reported sex to be a significant predictor of handwashing behaviour, indicating that women are more likely to wash their hands with soap at critical junctures than men (Asekun-Olarinmoye et al., 2014; Luby, Halder, et al., 2009; Tao et al., 2013). Among primary school children, some studies have reported that female students washed their hands more often than male students (Pickering et al., 2014; Yalçın et al., 2004), while other studies could not find different handwashing behaviours between boys and girls (Grimason et al., 2014; Saboori et al., 2013). Furthermore, age has been found to be a protective factor for good handwashing practices, with results indicating that handwashing behaviour is better among respondents from older age groups (Asekun-Olarinmoye et al., 2014; Tao et al., 2013). It seems that structuring handwashing behaviour by sex and age reveals differential impacts of these determinants on handwashing with soap at critical junctures.

3.3. Interactions among determinants of handwashing behaviour

A careful search of the literature has not revealed any studies investigating potential interactions and contingencies among social-cognitive and contextual determinants predicting handwashing behaviour in developing countries. Most studies have focused on the individual influences of either contextual determinants or social-cognitive determinants predicting handwashing. For example, a short distance to the water source may bolster a feeling of self-efficacy in always being able to wash hands at critical junctures, or having a handwashing

station next to the latrine might serve as a reminder to wash hands after defecation. In an attempt to change handwashing behaviour in southern Ethiopia, Contzen et al. (2015) implemented a public-commitment intervention to target descriptive and injunctive norms and an infrastructure-promotion intervention that encouraged participants to construct a handwashing station that facilitates washing hands and serves as a reminder. Pre-post data analysis revealed that their interventions performed better than a simple education intervention, suggesting that built and social-relational environments favourable to washing hands with soap resulted in more handwashing when combined with targeted social-cognitive factors. Further clarification of relationships between contextual determinants of handwashing behaviour and social-cognitive determinants would be useful. The preceding paragraphs reviewed the literature on contextual determinants supporting handwashing behaviour in developing countries and addressed multiple environmental dimensions. Whereas a range of contextual determinants have been identified, more integrative conceptualizations of supportive environments that encompass diverse categories and interrelations among them and in combination with social-cognitive determinants have yet to be developed.

4. Objectives of the thesis

This thesis aims to contribute to the prediction and understanding of handwashing behaviour in infrastructure-restricted settings. In particular, the goal of this thesis is to understand how social-cognitive determinants in combination with contextual factors are related to handwashing practices across different populations and settings in developing countries with the objective of developing more effective handwashing intervention programmes. The superordinate goal is to better understand and predict long-term health behaviour by providing a model that recognizes the influence of the physical and social environments along with individual characteristics through social-cognitive determinants on behaviour. Three studies were conducted.

1. **Using social-cognitive determinants to assess the effect of a large-scale handwashing awareness raising campaign**

The first study used the social-cognitive determinants of the RANAS model to evaluate a handwashing awareness-raising campaign in rural India. The aim of the study was to find out how the activities of a handwashing promotion event influenced the social-cognitive

representations that underlay visitors' intentions to wash hands. These research questions are addressed:

(1) Do the intention to wash hands with soap and the behavioural determinants change from before to directly after the visit to the handwashing promotion event?

(2) What are the differences in the intention to wash hands with soap and in the behavioural determinants between visitors who actively participate in campaign activities on handwashing and those who do not?

(3) Which changes in which behavioural determinants lead to changes in the intention to wash hands with soap?

The results of this visitor survey provide important information on how social-cognitive determinants were changed through a handwashing promotion event and how this affected the visitors' intention to wash hands. Moreover, the data allow analysis of whether and how a social and cultural event can affect both social-cognitive determinants and intention, leading to a better understanding of how a specific environment can influence mindset and beliefs.

2. Investigating the influence of social-cognitive determinants on handwashing beyond contextual factors

The second study investigated the role of environmental factors and social-cognitive determinants in predicting handwashing practices among caregivers of primary school children in rural parts of northern Burundi. This cross-sectional survey was implemented at household level and looked specifically at the potential impact of contextual factors on handwashing behaviour, while distinguishing between relatively fixed contextual factors including household economic constraints and the distance to the water source and self-created, that is, built contextual factors, such as the quantity of water and soap available in the household and the presence of a designated location for handwashing. Finally, the role of social-cognitive factors in predicting handwashing practices beyond contextual factors was examined. In this regard, the following questions are of interest:

(1) Are contextual factors associated with handwashing frequency and how do they influence the behaviour?

(2) What is the role of fixed and self-created contextual factors in predicting handwashing frequency and how do they interact?

(3) What is the relative contribution of psychosocial factors in explaining variance in handwashing frequency beyond contextual factors?

With regard to the theoretical health behaviour framework proposed in this thesis, the results of the study allow an initial investigation of the effect of the physical environment together with social-cognitive factors on handwashing behaviour. The findings serve as a starting point for developing better handwashing programmes by incorporating different aspects of the physical environment when developing interventions.

3. Identifying the relevant social-cognitive determinants of children's handwashing practices in order to develop school handwashing promotion programmes while considering the school environment

Finally, a survey assessing the RANAS social-cognitive determinants is used to identify the social-cognitive factors relevant to explaining primary school children's handwashing practices in rural Burundi and urban Zimbabwe. The development of a school handwashing programme in two different sub-Saharan countries applied the RANAS systematic approach to behaviour change. In addition to the quantitative interviews, the school handwashing environment was qualitatively assessed, including the presence of handwashing stations and the presence of soap and water for washing hands. The study addresses two main research questions:

(1) Which behavioural determinants are related to self-reported handwashing frequencies after using the toilet at school and what is their improvement potential?

(2) What theory-based behaviour change techniques can be directed at these behavioural determinants to generate changes in behaviour?

The results of the survey allow techniques to be selected that specifically tackle the social-cognitive determinants of the school children's handwashing practices so as to change behaviour. While putting a strong focus on the social-cognitive determinants, qualitative observational findings of the school handwashing environment are likewise considered and together, the data serve as a basis for developing a customized school handwashing campaign.

5. Description of the studies

5.1. Background of the surveys and study areas

The surveys presented in this thesis were conducted within the framework of a handwashing project initiated and funded by the Global Programme Water Initiatives section of the Swiss Agency for Development and Cooperation. The overall objective of the project is to increase awareness of and promote handwashing with soap at critical junctures among school children, caregivers, and policy makers in India and Africa and to disseminate the results among international actors in the sector.

In a first phase of the project, a handwashing awareness raising campaign called *The Great WASH Yatra* (TGWY) was implemented in India (Seimetz & Mosler, 2013). To raise the profile of handwashing with soap in India, TGWY engaged people in the issues of sanitation and hygiene in a playful and positive carnival-style atmosphere (see Figure 2). To facilitate the learning process throughout and beyond the campaign, Eawag, the Swiss Federal Institute of Aquatic Science and Technology, conducted an evaluation of the campaign. The campaign was jointly managed by WASH United gGmbH and Quicksand, a Delhi based multi-disciplinary innovation consultancy. TGWY event was strongly supported by the Government of India, the Ministry of Rural Development, state-level ministries, and local governments and took place in six different villages in northern India between Maharashtra and Bihar from 3 October to 19 November 2012.

Figure 2. Games, activities, and stations of *The Great WASH Yatra*.

Taking into account the lessons learnt from the first phase of the project, primary caregivers and schoolchildren became the targeted population of the project's second phase. The province of Ngozi in rural Burundi and the high-density suburbs of Harare, the capital of Zimbabwe, were chosen as intervention areas for the second phase of the project (see Figure 3). In each country, 20 primary schools with access to water and situated next to a health centre were selected with the assistance of local authorities. Within each of the schools' catchment areas, one colline (village) in Burundi and one high-density ward in the suburbs of Harare was randomly selected for conducting interviews. To understand the complexities influencing handwashing behaviour and to map out appropriate intervention strategies, an extensive baseline survey on handwashing practices was implemented in both settings.

Figure 3. Current handwashing practices at the study sites: primary school children washing hands in primary schools in Burundi (top left) and in Zimbabwe (top right, picture by Max Friedrich) and in rural parts of northern Burundi (bottom pictures).

5.2. Study designs

The data presented in Chapter II come from an on-site survey conducted with visitors of the TGWY. The same visitors were interviewed before and after their visit to TGWY. To assess the immediate effectiveness of TGWY on changing visitors' intention to wash hands, the questionnaire included items assessing the intention to wash hands and the underlying RANAS social-cognitive determinants. The study in Chapter III reports findings from a cross-sectional survey conducted in Ngozi Province, Burundi as a baseline for a larger longitudinal study investigating the impact of a behaviour change programme targeting caregivers of primary school children. The study in Chapter IV was a cross-sectional study conducted in rural parts of the province of Ngozi in the north of the Republic of Burundi and in urban suburbs of Harare, the capital of the Republic of Zimbabwe. The results from both countries served as baseline data for future campaign development and evaluation.

5.3. Data collection and participants

To evaluate the impact of TGWY campaign and to assess the participants' immediate responses concurrently, visitors to TGWY carnival were interviewed before and after their visit to the carnival site. Data were collected from October 14 to November 19, 2012 at the last five stations of TGWY, Indore, Kota, Gwalior, Gorakhpur, and Bettiah, all districts in India. Interviews lasted between 10 and 15 minutes and selection criteria included respondents' being at least 16 years of age, while the interviewer team was instructed to recruit participants equally from both genders as far as possible. A total of 687 visitors were interviewed before and after their visit to TGWY.

In Africa, the main target groups were the primary caregivers within a household, the person responsible for food preparation and child care with at least one child per household attending primary school. To identify the most influential behavioural determinants for triggering handwashing with soap among caregivers and their children attending primary school, a comprehensive baseline survey was conducted in rural Burundi and urban Zimbabwe including face-to-face interviews with the caregivers and the children. In the catchment areas of the 20 randomly selected primary schools in each country, participating households were chosen using the random route method; only households with at least one child attending primary school were considered (Hoffmeyer-Zlotnik, 2003). Interviews with the caregivers lasted about 75-90 minutes. The interviews with the school children lasted about 15-20 minutes and were usually conducted after the caregiver had been interviewed. To assess opportunities for handwashing and the sanitary situation in the schools, a comprehensive series of spot checks was carried out. In Burundi, in the rural parts of the province of Ngozi, data were collected in February and March, 2014. Final data were available from 671 children enrolled in 20 primary schools and their primary caregivers. In Zimbabwe, in the high-density suburbs of Harare, data were collected in July and August, 2014, resulting in 524 interviews.

For each survey, interviewers with a Master's degree in social or health sciences were recruited and received extensive training in the objectives and methodology of the survey, in the theoretical background of the questionnaire, in the procedures, and in interpersonal communication in the field.

5.4. Measures

All questionnaires contained questions about handwashing practices and the RANAS social-cognitive determinants. A specific questionnaire was developed for each setting and each target group (see Appendices I, II, and III). Each was largely based on previous instruments used in studies on handwashing practices and water consumption in developing countries (Contzen & Mosler, 2013; Huber & Mosler, 2013; Inauen, Tobias, & Mosler, 2013). After their visit to TGWY, participants from the on-site visitor survey in India were asked the same questions a second time, along with what handwashing game or activity they had actively participated in. In addition to their handwashing practices and the associated mindset, caregivers in Burundi were additionally asked about environmental aspects related to handwashing, including water supply, and the availability and costs of handwashing agents. To assess a household's socio-economic status, respondents were asked about household construction material, animal ownership, and ownership of various assets such as radios and bicycles in order to collate a household wealth index. Handwashing frequencies at critical junctures were measured on 5-point rating scales from (almost) never/0-1 times out of 10 to (almost) always/9-10 times out of 10. Likewise, 5-point unipolar items were used to measure the behavioural determinants. If multiple items were used to measure a social-cognitive determinant, the items were averaged to form scales. All items were translated into the local language and retranslated to ensure the meaning of the questions was accurate. In the schools, the spot-check observational method (Ruel & Arimond, 2002) was used to assess the availability of soap and water and the number, type, and condition of handwashing stations. Items were adjusted as necessary during interviewer training and the pre-tests preceding each data collection.

5.5. Collaborating organizations and institutions

The project was initiated, funded, and accompanied by the Global Programme Water Initiatives section of the Swiss Agency for Development and Cooperation. Eawag's key partner for the surveys conducted in India was Bader Jehan, who holds a PhD in social sciences. Implementation of the on-site visitor surveys at TGWY was possible through close collaboration with the organizing partners, WASH United gGmbH and Quicksand. The baseline data collections in Burundi and Zimbabwe were achieved through collaboration with the local universities. In Burundi, a memorandum of understanding was signed with the provincial university Université de Ngozi. Anne-Marie Boyayo, head of the collaborating

Institut Universitaire de Sciences de la Santé de l'Université de Ngozi, assumed the task of coordinating field data collection and assembled former students of the institute to conduct the surveys. In Zimbabwe, collaboration with the Department of Biological Science of the University of Zimbabwe was initiated and a memorandum of understanding was signed with the University of Zimbabwe.

Each time, further assistance in implementing the survey was obtained from national, regional, and local health and education departments and from local administrators, health care workers and school principals. In both Burundi and Zimbabwe, the findings were shared and discussed at stakeholder meetings with health centre personal, school personal, and local policy makers. After rigorous analyses of the baseline data collected in both countries and taking into consideration the discussions from the stakeholder meetings, a detailed proposal for two handwashing campaigns was developed in collaboration with the Università della Svizzera Italiana (USI), Lugano, and WASH United.

5.6. Ethics statement

All surveys were conducted in strict compliance with the ethical principles of the American Psychological Association (APA) and the Declaration of Helsinki. Study protocols were approved by the ethical review committee of the Faculty of Arts of the University of Zurich and by the Indian Ministry of Drinking Water and Sanitation, the national ethics committee of Burundi (Comité National d'Éthique pour la protection des êtres humains participants à la recherche biomédicale et comportementale), and the Research Council of Zimbabwe. Permission to conduct the surveys was obtained from the provincial health and education offices and from the principals of participating schools. Prior to data collection, all participants gave informed consent, and consent was obtained from all caregivers prior to seeking consent from their children.

Chapter II

Effect of an awareness raising campaign on intention and behavioural determinants for handwashing

Elisabeth Seimetz, Sonia Kumar, & Hans-Joachim Mosler

Abstract

This paper assesses the effectiveness of *The Great WASH Yatra* handwashing awareness raising campaign in India on changing visitors' intention to wash hands with soap and the underlying behavioural determinants. Interviews based on the RANAS (Risk, Attitudes, Norms, Abilities, Self-regulation) model of behaviour change were conducted with 687 visitors before and after their visit to the campaign. Data showed that a campaign visit had little effect on the intention to wash hands with soap, even when comparing visitors who had actively participated in handwashing games with those who had not. After a campaign visit, knowledge about the benefits of washing hands had increased by almost half a standard deviation. A multiple linear regression analysis revealed that when considering all behavioural determinants change scores simultaneously, they were able to explain 57% of the variance in the intention change score. These findings suggest that substantively changing behaviour requires more than improving knowledge and emphasizing the importance of washing hands. Identifying the crucial behavioural determinants for handwashing may be an important first step in planning effective large-scale promotion programmes.

Keywords: Health determinants; Disease prevention; Developing countries; Campaign evaluation; Psychosocial theories

Introduction

Diarrhoea and pneumonia are still the leading causes of mortality among children under five years of age in low-income and middle-income countries (Walker et al., 2013). India ranks among the five countries with the highest estimated child mortality worldwide, with about 200,000 deaths per year (L. Liu et al., 2012). A recent systematic review of handwashing practices and their effect on diarrheal diseases suggests that interventions promoting handwashing with soap lead to a 40% reduction in the risk of diarrhoea (Freeman et al., 2014). Despite its potential, handwashing with soap is seldom practiced in low-income countries (Scott, Curtis, & Rabie, 2003). A review of studies using structured observations to measure handwashing from 11 countries found that only 17% of child caregivers washed their hands with soap after using the toilet (Curtis et al., 2009). Likewise, Freeman et al. (2014) estimated that 19% of people worldwide wash hands with soap after contact with faeces. For India, the researchers indicate a mean frequency of 15%. Considering India's low handwashing rates and the country's high disease burden, handwashing promotion efforts in India are especially needed.

To raise the profile of handwashing with soap in India, WASH United developed a concept for a travelling handwashing campaign called *The Great WASH Yatra* (TGWY). TGWY engaged visitors in a fun and playful way using the positive power of cricket, fun, games, and Bollywood celebrities to promote life-saving handwashing behaviour in rural parts of northern India. This paper assesses the immediate effectiveness of TGWY on changing visitors' intention to wash hands with soap after using the toilet and the behavioural determinants underlying handwashing. The goal of the developers of TGWY was to create a unique Indian environment to embed messages on water, sanitation, and hygiene that would appeal to a predominantly rural audience and be immersive and genuinely fun. Most activities were based on traditional Indian board, outdoor, or knowledge games. Supplementary material gives a detailed overview of the games and activities that were evaluated by this study (see Appendix I, Table 13).

To identify the psychological mechanisms tackled by TGWY, the methodological approach of the present evaluation study was based on Mosler's RANAS model of behaviour change (2012). The model was explicitly designed for the water and sanitation sector in developing countries. As suggested by Michie et al. (2008) and Lippke and Ziegelmann (2008), the RANAS model combines different theories of behaviour change to define a set of causal

determinants of health behaviour. The model classifies the factors influencing behaviour formation into five blocks: risk, attitudinal, normative, ability, and self-regulation factors. Table 1 provides an overview and description of the behavioural determinants of the RANAS model used in this study. Given that the respondents' actual handwashing behaviour could not be measured on-site, the intention to wash hands with soap after using the toilet was used instead of actual behaviour measures.

The aim of the present evaluation study was to find out in what way the activities of TGWY had an influence on the behavioural determinants specified by the RANAS model and thus on the visitors' intention to wash hands with soap. The following research questions were addressed: (1) Did the intention to wash hands with soap and the behavioural determinants change from before to directly after the visit to TGWY? (2) What are the differences in the intention to wash hands with soap and in the behavioural determinants between visitors who had actively participated in campaign activities on handwashing and those who had not? (3) Which changes in which behavioural determinants led to changes in the intention to wash hands with soap?

Table 1. Example Items for the Behavioural Determinants

Behavioural determinants	Description	Example items
Risk factors		
Perceived vulnerability	Perceived risk of contracting diarrhoea	How high do you feel is the risk that you get diarrhoea?
Perceived severity	Perceived seriousness of the consequences of diarrhoea	Imagine you contracted diarrhoea, how severe would be the impact on your life in general?
Health knowledge	Knowledge about the causes and symptoms of diarrhoea	Can you tell me what causes diarrhoea?
Attitude factors		
Instrumental beliefs		
Costs	Beliefs about the costs of always washing hands with soap	Do you think that washing hands with soap and water is expensive?
Effort	Beliefs about the efforts needed to execute the behaviour	Do you think that washing hands with soap and water takes a lot of effort?
Response	Belief that the behaviour will lead to the desired outcome	How certain are you that washing hands with soap and water after using the toilet prevents you and your family from getting diarrhoea?
Attraction	Feelings of attractiveness when using soap to wash hands	Do you feel more attractive when you wash your hands with soap and water?

Behavioural determinants	Description	Example items
Affective beliefs		
Liking	Feelings of liking associated with washing hands with soap	How much do you like or dislike washing hands with soap and water?
Dirtiness	Feelings of dirtiness when not washing hands with soap	Do you feel dirty if you don't wash your hands with soap and water after using the toilet?
Norm factors		
Injunctive norm	Perceptions of other peoples' opinions about washing hands with soap	People who are important to you, do they rather think you should or you should not wash your hands with soap and water after using the toilet?
Ability factors		
Action self-efficacy	Confidence in the abilities to successfully perform the behaviour	Do you think you are able to always wash hands with soap and water after using the toilet?
Maintenance self-efficacy	Confidence in the abilities to successfully maintaining the behaviour	How confident are you that you can wash hands with soap and water even if urgent tasks arise which interfere with handwashing?
Recovery self-efficacy	Confidence in the abilities to successfully return to the behaviour	Imagine you have stopped washing hands with soap and water for several days, for example because there was no water for handwashing. How confident are you to start washing hands again?
Self-regulation factors		
Action control	Specification of when, where and how to wash hands with soap	How strongly do you try to wash hands with soap and water?
Commitment	Strength of identification with the behaviour	Do you feel committed to wash hands with soap and water after using the toilet?

Method

The Great WASH Yatra Campaign

TGWY was a traveling campaign engaging visitors in the issues of sanitation and hygiene in a playful and carnival-style atmosphere. The campaign was jointly managed by WASH United gGmbH and Quicksand, a Delhi based multi-disciplinary innovation consultancy. TGWY had two key goals: promoting life-saving handwashing behaviour and toilet usage. A set of interactive educational games and activities were developed, inspired by cricket, Bollywood, parlour games, and Indian songs and dance. The game zone comprised nearly 20 games that

were housed in custom-designed stalls, arcade-like settings, or outdoors. Each game was designed to communicate one or more of the core messages: the necessity of using toilets and the necessity of washing hands with soap. The core message of about half of the activities was to discourage open defecation and promote the usage of toilets. Because the focus of the present evaluation study was solely on the promotion of handwashing behaviour, only games and activities targeted at increasing handwashing rates were included in the analyses. Handwashing games and activities were such as the *Clean Hands Challenge*, where germ targets are marked out on a large hand shaped cut-out and act as targets which players have to successfully hit with a wet soapy sponge, or the *Soap Lab* where participants dip their hands into coloured chalk and then wash hands once with water only and once with soap and water in order to see for themselves the importance of soap for removing all of the chalk.

Survey Procedures and Study Areas

Data was collected over a five-week period, from October 14 through November 19, 2012, within five stations of TGWY by means of structured interviews. The same visitors were interviewed before and after their visit to TGWY. Selection criteria were that respondents were at least 16 years of age, that they intended to visit TGWY immediately after the first interview (pre-interview), and that they were committed to giving a second interview (post-interview) after their visit. Each interview lasted between 10 and 15 minutes. Interviewers were instructed to recruit participants from both genders equally if possible. Each respondent who participated in both the pre- and the post-interview received three bars of soap as an incentive. Seven interviewers with a Master's degree in social sciences or humanities were recruited and received training in the objectives and methodology of the survey, in the theoretical background of the questionnaire, and in the procedures and interpersonal communication in the field. The interviewers familiarised themselves with the questionnaire by reviewing the purpose for each item and by conducting role-plays and mock interviews on how to administer the questionnaire and record responses. The study was conducted in strict compliance with the ethical principles of the American Psychological Association (APA) and the Declaration of Helsinki. The study protocol was approved by the ethical review committee of the Faculty of Arts of the University of Zurich and by the Indian Ministry of Drinking Water and Sanitation.

Participants

A total of 1005 visitors were invited to participate in the study. One hundred and seventy-six visitors did not want to be interviewed for the pre-interview and 142 of the visitors who had participated in the pre-interview did not want to be interviewed again for the post-interview, resulting in 687 matching pre- and post-interviews. The sample consisted of 59.4% male and 40.6% female respondents. The age of the respondents ranged between 16 and 84 years, with a median age of 32.8 years (*SD* = 12.4). Twenty-two per cent of the interviewees had never attended school, 3.5% completed one to four years of schooling, 19.3% had completed five to eight years, 29.7% had completed ten to twelve years, and 25.6% had completed a secondary school degree or higher. The majority were Hindus (88.2%), followed by Muslims (11.6%). Seventy-seven per cent of the respondents were married and 22.7% were single. On average, visitors spent 41 minutes at TGWY event. The time spent at the event did not differ between participants and non-participants and did not affect the changes in the behavioural determinants or in their intention to wash hands.

Measures

The questionnaire was developed from previous instruments used in studies on handwashing practices and water consumption in developing countries (Contzen & Mosler, 2013; Huber & Mosler, 2013; Inauen, Tobias, et al., 2013). All English items were translated into Hindi and retranslated to ensure the meaning of the questions was accurate (see Appendix I for an English version of the questionnaire). The pre-visit questionnaire included structured items addressing the intention to wash hands with soap, the behavioural determinants of the RANAS model, and socio-demographic characteristics. Example items for the behavioural determinants are displayed in Table 1. Five-point unipolar items (from 1 to 5) were used to measure the behavioural determinants (e.g., 1 = *not at all* and 5 = *very much*). Two items (the affective belief liking and the injunctive norm) were originally assessed on a 9-point scale with bipolar verbal descriptors at each end of the scale (e.g., 1 = *dislike it very much* and 9 = *like it very much*). It was decided to reduce the 9-point scale to a 5-point scale by combining the descriptions of former scores of 1 through 5, because less than 5% of respondents had used this half of the scale. If multiple items were used to measure a behavioural determinant, the items were averaged to build scales. A single question was used to quantify the intention to wash hands with soap ("How strongly do you intend to always wash hands with soap and water after using the toilet?"). Response options were rated on 5-point scales, with 1 representing *not at all strongly* and 5 representing *very strongly*. During the administration of

the post-questionnaire, items on the intention to wash hands with soap and on the behavioural determinants were administered a second time. In addition, visitors were asked in which handwashing game or activity they had actively participated in.

Data Analysis

We used Paired Student's t-tests to compare pre- and post-visit scores in intention and the behavioural determinants. Two-way repeated measures analyses of variance were used to determine if there were any significant differences from pre- to post-visit in the behavioural determinants and in the intention to wash hands with soap among handwashing games participants and non-participants. Change scores for all behavioural determinants and for the intention to wash hands with soap were calculated to reflect differences from pre- to post-visit. A forced-entry multiple linear regression analysis using change scores was carried out to explore the relationship between changes in the behavioural determinants and changes in the intention for washing hands with soap. When appropriate, the threshold for statistical significance was corrected for multiple comparisons using Bonferroni's method (alpha of .05 divided by the number of comparisons). All analyses were performed using IBM SPSS Statistics (version 21.0 for Windows. Armonk, NY: IBM Corp.).

Results

(1) Overall Impact of TGWY on the Intention to Wash Hands and on the Behavioural Determinants

Means and standard deviations for pre- and post-visit measures of the behavioural determinants and the intention to wash hands with soap are presented in Table 2. After applying Bonferroni's correction for multiple comparisons (p significant only if $< .003 = 0.05/15$), significant differences between pre- and post-visit scores were observed for all behavioural determinants except for maintenance self-efficacy ($p = .255$). Most of the differences were found to be less than Cohen's (1988) convention for a small effect size (Cohen's $d = 0.20$). Affective beliefs liking ($d = 0.22$) and dirtiness ($d = 0.31$), the injunctive norm ($d = 0.32$), and action self-efficacy ($d = 0.20$) showed small effect sizes. The risk factor health knowledge ($d = 0.47$) and the instrumental belief response ($d = 0.38$) were close to a medium effect size according to Cohen's criteria ($d = 0.50$). Only perceived vulnerability and

the instrumental belief attraction showed a significant decrease in scores from pre- to post-visit.

(2) Differences Between Handwashing Games Participants and Non-Participants

Out of the 687 interviewed visitors, 366 respondents (53.3%) indicated having actively participated in a handwashing game or activity. Separate two-way repeated measures analyses of variance were used to determine differences from pre- to post-visit in the intention to wash hands with soap between handwashing games participants and non-participants. Note that the instrumental belief effort was excluded because 671 (98.0%) respondents reported handwashing as being no effort at all.

Table 2. Differences in the Behavioural Determinants and in the Intention to Wash Hands With Soap Between Pre- and Post-Visit

	Pre-visit		Post-visit				
Behavioural determinants	*M*	*SD*	*M*	*SD*	*t*	*p*	Cohen's *d*
Risk factors							
Perceived vulnerability	2.62	1.38	2.32	1.25	-4.53	.000	-0.17
Perceived severity	3.34	1.40	3.57	1.11	3.54	.000	0.14
Health knowledge	2.03	0.92	2.54	1.11	12.23	.000	0.47
Attitude factors							
Instrumental beliefs							
Costs	4.30	1.20	4.47	0.94	4.14	.000	0.16
Effort	4.97	0.25	4.92	0.41	2.91	.004	-0.11
Response	3.95	0.96	4.32	0.58	9.80	.000	0.38
Attraction	3.69	1.00	3.47	1.01	-4.06	.000	-0.16
Affective beliefs							
Liking	4.11	0.88	4.32	0.72	5.64	.000	0.22
Dirtiness	4.08	1.02	4.41	0.74	7.92	.000	0.31
Norm factors							
Injunctive norm	4.21	1.11	4.56	0.72	8.26	.000	0.32
Ability factors							
Action self-efficacy	4.29	0.73	4.44	0.46	5.33	.000	0.20
Maintenance self-efficacy	3.88	0.94	3.93	0.64	1.14	.255	0.04
Recovery self-efficacy	3.91	0.93	4.00	0.60	2.78	.006	0.11
Self-regulation factors							
Action control	3.81	1.04	3.93	0.70	3.02	.003	0.12
Commitment	4.08	0.88	4.15	0.55	2.13	.034	0.08
Intention	3.98	0.92	4.09	0.62	3.04	.002	0.12

Note. $N = 687$. All variables ranged from 1 to 5.

Table 3 provides pre- and post-visit means and standard deviations for handwashing games participants and non-participants as well as results of the analyses of variance. Significant

interaction effects were present for three of the behavioural determinants: the instrumental belief attraction, action self-efficacy, and action control. The interaction effects indicated that when comparing pre- and post-visit scores, handwashing games participants demonstrated a higher decrease in how attractive they feel after washing hands with soap and less improvement in their perceived self-efficacy to perform the behaviour and in their determination to execute and control the behaviour than non-participants. Effect sizes for the instrumental belief attraction and for action control were negligible ($\eta 2 < .01$). For self-efficacy, the interaction between handwashing games participants and pre- and post-visit time of interview accounted for 1.8% of the total score variability. After applying Bonferroni's correction for multiple comparisons, only the interaction effect action self-efficacy remained significant (*p* significant only if < .003 = 0.05/15).

Table 3. Means (M) and Standard Deviations (SD) of Pre-Visit, Post-Visit and Change Scores of the Behavioural Determinants and the Intention to Wash Hands With Soap by Active Participants and Passive Spectators

	Handwashing games participants			Non-participants							
Behavioural determinants	Pre-visit *M* (*SD*)	Post-visit *M* (*SD*)	Change score *M* (*SD*)	Pre-visit *M* (*SD*)	Post-visit *M* (*SD*)	Change score *M* (*SD*)	*df1*	*df2*	*F*	*p*	η^2
Risk factors											
Perceived vulnerability	2.55 (1.39)	2.22 (1.24)	-0.34 (1.69)	2.69 (1.36)	2.45 (1.26)	-0.24 (1.69)	1	675	0.52	.473	.001
Perceived severity	3.33 (1.41)	3.60 (1.15)	0.28 (1.67)	3.34 (1.38)	3.52 (1.07)	0.17 (1.74)	1	676	0.66	.418	.001
Health knowledge	2.14 (0.95)	2.66 (1.12)	0.52 (1.14)	1.92 (0.87)	2.41 (1.08)	0.50 (1.03)	1	679	0.05	.831	.000
Attitude factors											
Instrumental beliefs											
Costs	4.42 (1.09)	4.62 (0.75)	0.19 (0.96)	4.15 (1.30)	4.30 (1.10)	0.15 (1.22)	1	679	0.30	.585	.000
Response	4.01 (0.87)	4.33 (0.56)	0.32 (0.94)	3.86 (1.05)	4.30 (0.61)	0.43 (1.03)	1	672	2.15	.143	.003
Attraction	3.70 (0.95)	3.36 (1.03)	-0.34 (1.40)	3.67 (1.05)	3.59 (0.99)	-0.07 (1.34)	1	677	6.27	.012	.009
Affective beliefs											
Liking	4.20 (0.80)	4.40 (0.60)	0.20 (0.92)	4.00 (0.95)	4.23 (0.82)	0.23 (1.09)	1	679	0.18	.669	.000
Dirtiness	4.16 (0.88)	4.46 (0.73)	0.31 (1.05)	3.99 (1.13)	4.35 (0.76)	0.36 (1.14)	1	671	0.45	.502	.001
Norm factors											
Injunctive norm	4.30 (0.96)	4.60 (0.59)	0.31 (1.08)	4.09 (1.25)	4.50 (0.85)	0.41 (1.16)	1	665	1.27	.259	.002

	Handwashing games participants			Non-participants							
Behavioural determinants	Pre-visit *M* (*SD*)	Post-visit *M* (*SD*)	Change score *M* (*SD*)	Pre-visit *M* (*SD*)	Post-visit *M* (*SD*)	Change score *M* (*SD*)	*df1*	*df2*	*F*	*p*	η^2
Ability factors											
Action self-efficacy	4.42 (0.56)	4.46 (0.43)	0.05 (0.60)	4.16 (0.86)	4.40 (0.50)	0.25 (0.78)	1	678	13.31	.000	.018
Maintenance self-efficacy	3.98 (0.85)	3.98 (0.55)	0.00 (0.88)	3.78 (1.01)	3.86 (0.73)	0.09 (1.01)	1	679	1.71	.192	.003
Recovery self-efficacy	4.02 (0.84)	4.07 (0.48)	0.05 (0.83)	3.78 (1.00)	3.92 (0.71)	0.15 (0.96)	1	680	3.52	.061	.005
Self-regulation factors											
Action control	3.95 (0.94)	3.99 (0.63)	0.04 (1.04)	3.64 (1.13)	3.87 (0.76)	0.22 (1.14)	1	679	4.56	.033	.007
Commitment	4.17 (0.77)	4.23 (0.46)	0.06 (0.76)	3.98 (0.99)	4.05 (0.63)	0.07 (0.90)	1	679	0.02	.878	.000
Intention	4.08 (0.81)	4.16 (0.54)	0.09 (0.85)	3.87 (1.01)	4.00 (0.71)	0.12 (0.97)	1	675	0.23	.628	.000

Note. $N = 687$. All variables ranged from 1 to 5.

(3) Changes in the Behavioural Determinants Explaining Changes in the Intention to Wash Hands With Soap

Descriptive statistics of the change scores of the intention to wash hands with soap and the behavioural determinants are shown in Table 4. Overall, mean differences from pre- to post-visit were low. Health knowledge showed the highest increase from before to after the visit (M = 0.51; SD = 1.09). A multiple linear regression analysis using change scores was performed with the intention to wash hands with soap as the outcome variable and the behavioural determinants as the predictor variables (see Table 4). The analysis was found to be statistically significant $F(14, 615) = 60.682$, $p < .001$, indicating that the change scores of the behavioural determinants were good predictors of the intention to wash hands with soap change score. The linear combination of the behavioural determinants, as indexed by the adjusted R^2 statistic, accounted for 57% of the variance in the change score of the intention to wash hands with soap. The Durbin Watson value was close to 2 (1.90), indicating that the data met the assumption of uncorrelated residuals. None of the predictors had a variance inflation factor (VIF) higher than 4.65, and most were under 2.00. We found that the change scores of five behavioural determinants contributed significantly to explaining the increase in the intention to wash hands with soap from pre- to post-visit (see Table 4). Change scores in the instrumental belief response, injunctive norm, action self-efficacy, and commitment had significant positive regression weights, indicating visitors with a higher increase on these scales were expected to have a higher increase in their intention to wash hands with soap. The strongest predictor was commitment ($\beta = .51$, $t = 10.27$, $p < .001$). Perceived vulnerability had a significant negative weight, opposite in sign from its correlation with the intention change score. The negative beta weight indicated that, after accounting for the remaining behavioural determinants, those visitors with a higher increase in perceived vulnerability were expected to have less increase in their reported intention to wash hands with soap.

Table 4. Descriptive Statistics of the Change Scores and Regression Analysis Summary for Changes in the Behavioural Determinants Explaining Changes in the Intention to Wash Hands With Soap from Pre- to Post-Visit

					95% CI (*B*)		
Behavioural determinants	*M* (*SD*)	*B*	SE *B*	*β*	*LL*	*UL*	*p*
Risk factors							
Perceived vulnerability	-0.29 (1.69)	-0.05	0.02	-.10	-0.08	-0.02	.001
Perceived severity	0.23 (1.70)	-0.01	0.02	-.01	-0.04	0.02	.706
Health knowledge	0.51 (1.09)	0.02	0.02	.02	-0.02	0.06	.407
Attitude factors							
Instrumental beliefs							
Costs	0.17 (1.09)	0.01	0.02	.01	-0.04	0.05	.793
Response	0.37 (0.98)	0.10	0.03	.11	0.04	0.15	.001
Attraction	-0.22 (1.38)	0.03	0.02	.05	-0.01	0.07	.139
Affective beliefs							
Liking	0.22 (1.00)	-0.05	0.03	-.06	-0.11	0.00	.072
Dirtiness	0.33 (1.09)	-0.06	0.03	-.07	-0.12	0.00	.067
Norm factors							
Injunctive norm	0.36 (1.12)	0.10	0.03	.13	0.05	0.16	.000
Ability factors							
Action self-efficacy	0.14 (0.69)	0.12	0.04	.09	0.04	0.20	.005
Maintenance self-efficacy	0.04 (0.94)	0.04	0.05	.05	-0.06	0.15	.390
Recovery self-efficacy	0.10 (0.90)	0.08	0.06	.08	-0.03	0.19	.166
Self-regulation factors							
Action control	0.13 (1.09)	0.04	0.03	.05	-0.01	0.10	.107
Commitment	0.07 (0.83)	0.57	0.06	.51	0.46	0.68	.000
Intention	0.11 (0.91)						

Note. N = 989. Adjusted R^2 = .57. CI = Confidence interval.

Discussion

Principal Findings

This study investigated three research questions addressing the impact of a large-scale handwashing awareness-raising campaign on the intention to wash hands with soap and on the behavioural determinants of the RANAS model underlying intention.

(1) Overall impact of TGWY on the intention to wash hands and on the behavioural determinants. Results from the on-site visitor survey showed that there were small differences in the intention and in the behavioural determinants from before to after the visit of TGWY campaign. Generally speaking, a campaign visit had a medium effect on the visitors' knowledge about the benefits of washing hands and a small to medium effect on their certainty that washing hands with soap and water after using the toilet protects them and their

family from diarrhoea. Even though an increase in health knowledge was observed, the marginal increase in the intention confirms the notion that knowledge alone is not sufficient to motivate a change in behaviour (Bandura, 2004; Fisher & Fisher, 1992). Past studies indeed suggest that traditional health education may be ineffective in changing hygiene behaviour (Huda et al., 2012; Loevinsohn, 1990; Pittet et al., 2004) and that even an increase in hygiene awareness does not lead to changes in handwashing practices (Biran et al., 2009).

(2) Differences between handwashing games participants and non-participants. When comparing visitors who had actively participated in handwashing games with those who had not, there was no difference in the changes in the intention to wash hands. The most important finding was that handwashing games participants showed less increase in their confidence to always being able to wash hands with soap after using the toilet. This result appears counterintuitive at first glance, as past research has confirmed that self-efficacy is an important determinant of health-protective behaviour (e.g., De Wandel, Maes, Labeau, Vereecken, & Blot, 2010; Floyd, Prentice-Dunn, & Rogers, 2000). However, it makes sense when considering that respondents who were explicitly confronted with handwashing messages might have realized how difficult it would be to always wash hands at critical junctures. Occupation with handwashing topics seemed to impede an increase in the perceived confidence in executing the behaviour, a result to be tested in further research.

(3) Changes in the behavioural determinants explaining changes in the intention to wash hands with soap. The last research question of this study concerned the extent to which the change scores of the behavioural determinants are important in explaining changes in the intention to wash hands with soap. The determinants were able to explain a substantial part of the variance in the intention change score. Five determinants significantly predicted the changes in intention: the perception of how vulnerable one is to diarrhoea, the belief that washing hands with soap prevents from getting diarrhoea, the sentiment whether important people think handwashing is vital, the confidence in one's own abilities to perform the behaviour, and, most importantly, the personal importance of and commitment to washing hands with soap after using the toilet. Interestingly, a decrease on the vulnerability scale was associated with an increase in the intention to wash hands. One possible interpretation is reverse causality, meaning that visitors reporting a higher intention of washing hands with soap after using the toilet felt less vulnerable to diarrhoea at post-visit than those who did not report this increase in intention and thus did not feel less vulnerable. Correspondingly, there is evidence that caregivers perceiving more threat from not washing hands with soap were less

likely to have a designated place for handwashing (Devine et al., 2012). Personal commitment to always washing hands with soap after using the toilet was the strongest predictor for intention. Commitment to a behaviour can be described as the amount of internal pressure felt by a person to perform the behaviour (Tobias, 2009). An increase in intention thus depended on an increase in the intensity of commitment, i.e. the importance of handwashing to the respondent. Intention formation has indeed been stated to imply a commitment to perform a certain behaviour (Gollwitzer & Sheeran, 2006). Moreover, commitment has been found to have a high impact potential in behaviour change interventions on safe water consumption (Huber & Mosler, 2013; Inauen, Tobias, et al., 2013).

Part of the approach of TGWY was to create an environment which associated the issue of sanitation and hygiene with positive emotions through songs, dance, drama, parlour games, and film. Moreover, the Indian Minister of Drinking Water and Sanitation attended the press conference at several stops and popular cricket players and a Bollywood actress were brand ambassadors of the campaign. Since no meaningful differences were found between visitors who had played actively and those who had not, the results suggest that attending TGWY was effective in itself and that it did not make a significant difference whether visitors actively engaged in activities or not.

Strengths and Weaknesses of the Study

To the best of our knowledge, this is the first study to evaluate a large-scale handwashing campaign by assessing its immediate effect on participants' intention to wash hands and the underlying behavioural determinants. A high response rate was achieved from addressed campaign visitors and follow-up rates were high. The strong resonance of TGWY had led to many more visitors than expected by the organizers and resulted in long queues at the different stalls. As a consequence, over half of the interviewed visitors had not actively participated in any kind of activity focusing on handwashing. However, no big differences were found between visitors who had participated in handwashing games and those who had not. The relatively low immediate impact of the campaign on the intention to wash hands with soap after using the toilet is consistent with previous studies on handwashing promotion campaigns. Those campaigns that typically find handwashing programmes to reduce child diarrhoea require intensive and controlled interventions (Curtis et al., 2009; Freeman et al., 2014).

The reliance on self-reported intention as an indicator predicting actual behaviour outcome is a potential limitation to the study. Due to the nature of the study, it was not possible to measure any changes in handwashing behaviour, let alone observe handwashing practices at home. The limitations in using intention measures instead of actual behaviour measures are acknowledged. However, even though intention does not necessarily mean behaviour uptake, behaviour change rarely occurs with a lack of intention (Fishbein & Ajzen, 1975; Orbell & Sheeran, 1998). According to different meta-analyses, behavioural intention is a valid proxy for behaviour, accounting for considerable proportions of the variance in actual behaviour (22-28%) across a wide number of domains (Armitage & Conner, 2001; Sheeran, 2002). Intention still is the key psychological predictor of behaviour (Eccles et al., 2006; Sheeran, 2002) and a medium- to large-sized change in intention has been found to lead to a small- to medium-sized change in behaviour (Webb & Sheeran, 2006). Jenner et al. (2002) even have identified intention as a significant predictor to perform appropriate hand hygiene.

Practical Implications

Hygiene promotions, including handwashing, are ranked as the most cost-effective interventions to prevent disease (Bhutta et al., 2013; Cairncross & Valdmanis, 2006; Laxminarayan et al., 2006). TGWY campaign seemed to have raised awareness on the importance of washing hands with soap and water after using the toilet. However, it is clearly not enough to tell people to wash their hands in order not to get sick to change such a complex behaviour as handwashing (Curtis & Biran, 2001). For example, a study undertaken in Uganda found that 84% of respondents recognized the importance of washing their hands after using the toilet, but only 14% were observed to do so (Steadman Group, 2007). Deep-rooted habitual practices such as handwashing can be difficult to change (Biran et al., 2014). The first step is to understand the behaviour and the underlying behavioural determinants. Successful interventions will furthermore have to address other relevant behavioural determinants for handwashing. Programmes including regular home visits or community events have been an important component of a number of apparently successful hygiene promotion programmes (Contzen et al., 2015; Galiani, Gertler, & Orsola-Vidal, 2012; Luby et al., 2004; Scott et al., 2008). Further research should focus on closing the existing gaps in information needed to design effective large-scale handwashing interventions that require less intensive monitoring and have a long-term impact.

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Chapter III

The influence of psychosocial factors on handwashing beyond contextual factors

Elisabeth Seimetz, Anne-Marie Boyayo, & Hans-Joachim Mosler

Abstract

Washing hands with soap after contact with faeces and before handling food is known to be one of the most effective measures to reduce the risk of infection. Nonetheless, handwashing rates in infrastructure-restricted settings remain seriously low. Little is known about how context, both alone and in interaction with psychosocial factors, influences hand hygiene behaviour. The aim of this paper is to explore how both contextual and psychosocial factors affect handwashing practices. A cross-sectional survey was conducted with 660 caregivers of primary school children in northern rural Burundi. Hierarchical regression analyses were used to investigate the relative contribution of contextual and psychosocial factors to handwashing frequencies. Household wealth, the amount of water per person, and having a designated location for washing hands were contextual factors significantly predicting handwashing frequency, whereas the time spent collecting water and the amount of money spent on soap per person per month were not. Taken together, the contextual factors explained about 13% of the variance of the reported handwashing frequency, and the addition of the psychosocial factors to the model explained a further 41%. The most important predictors were high feelings of self-efficacy, followed by planning how, when, and where to wash hands and always remembering to do so. When all the psychosocial factors were included in the regression model, having at least the recommended 7.5 litres of water per person per day available was the only contextual factor that remained a significant contextual predictor for handwashing frequency. The present results emphasize potential interactions among contextual and psychosocial factors and their impact on handwashing frequency. The findings suggest that contextual constraints might be perceived rather than actual barriers and highlight the value of psychosocial factors in understanding hygiene behaviours. We therefore suggest considering multiple determinants of behaviour when developing handwashing promotion programmes.

Key words: Handwashing with soap; Diarrhoea; Contextual factors; Household environment; socio-economic status; Burundi

Introduction

Contaminated hands have been shown to be one of the main the vector for communicable diseases (Mattioli et al., 2012). The use of soap to wash hands at critical junctures, such as before eating, before preparing food, and after defecating, has the potential to reduce morbidity and mortality from infectious diseases in resource-poor settings (Ejemot-Nwadiaro et al., 2008; Freeman et al., 2014; Rabie & Curtis, 2006). Despite its proven effectiveness, the prevalence of washing hands with soap remains seriously low in developing countries, with a mean handwashing prevalence ranging between 13% and 17% in low- and middle-income regions (Freeman et al., 2014). In Burundi, one of the 10 poorest countries on earth according to the UN 2014 Human Development Report (Malik, 2014), common childhood infections such as respiratory and diarrhoeal illnesses are estimated to cause up to 12,900 deaths per year among children younger than 5 years (Li Liu et al., 2012). Since handwashing is the most cost-effective way to prevent the spread of communicable diseases (Aiello, Coulborn, Perez, & Larson, 2008), the Swiss Agency for Development and Cooperation launched a handwashing programme in the province of Ngozi, Burundi, in 2014. The first phase is seen as a pilot project whose outcomes will serve to develop an upscaled version of the programme. The primary objective of the intervention is to increase the proportion of the population who wash their hands at critical junctures. Understanding handwashing practices in rural Burundi is an important baseline assessment for the programme.

Many studies have focused on determinants and indicators of handwashing with soap, aiming to reduce morbidity from diarrhoea and respiratory infections. Research in the field of health behaviour indicates the involvement of a complex set of factors. One model of water, sanitation and hygiene behaviour (WASH) is the integrated behavioural model for water, sanitation and hygiene (IBM-WASH) (Dreibelbis, Winch, et al., 2013), a synthesis of eight previous models of WASH and WASH-related behaviours. The IBM-WASH model introduces a psychosocial dimension and a contextual dimension to guide future behaviour change interventions. Psychosocial factors include awareness, personal beliefs, and social norms. Contextual factors are characteristics of the environment that influence behaviour.

Psychosocial factors

Behaviour change theories and models such as the theory of planned behaviour (De Wandel et al., 2010; Sax, Uçkay, Richet, Allegranzi, & Pittet, 2007), the knowledge, attitude and practice approach, and multiple disciplinary approaches (Aunger et al., 2010) have been

applied to elucidate the behavioural determinants of handwashing. To assess the psychosocial dimension of handwashing behaviour, we drew on the RANAS (Risks, attitudes, norms, abilities, self-regulation) model of behaviour change (Mosler, 2012). The RANAS systematic approach to behaviour change is an approach designed for behaviour change in the water and sanitation sector in developing countries. The model integrates different theories of behaviour change and includes a broad set of factors predicting behaviour. The approach has successfully been applied to increase safe water consumption in Ethiopia and Bangladesh (Huber, Tobias, & Mosler, 2014; Inauen & Mosler, 2014) and has proven its effectiveness in increasing handwashing behaviour in water-scarce regions in southern Ethiopia. In this first phase of the project, we used the RANAS behavioural factors to assess the psychosocial dimension of handwashing practices among the project's target group, caregivers of children attending primary school.

Contextual factors

The contextual dimension of the IBM-WASH refers to the environment in which a behaviour takes place. Environmental psychologists have highlighted the importance of transactions between individuals and their physical settings (Bronfenbrenner, 1977; Gifford et al., 2011). In these transactions, individuals change their environment, and their behaviour is subsequently determined by this self-created context. We thus distinguished between relatively fixed contextual factors and self-created contextual factors. To operationalize these constructs, we chose specific handwashing-related characteristics that have been suggested by previous studies to be associated with handwashing behaviour. We considered household economic constraints and the distance from the water source as fixed contextual factors (e.g. Halder et al., 2010; Hunter, MacDonald, & Carter, 2010; Pickering & Davis, 2012; Schmidt et al., 2009). The quantity of water and soap available in the household and the presence of a designated location for handwashing were deemed self-created contextual factors (e.g. Bowen et al., 2013; Gilman et al., 1993; Scott, Lawson, & Curtis, 2007).

Fixed contextual factors

Household wealth. Several studies have shown that socio-economic determinants, such as household assets, housing construction material, and level of education, are associated with handwashing practices. Gorter et al. (1998) observed that hands were more likely to be washed before preparing a baby's bottle in families owning a radio and in which the mother had had more than three years of schooling. Luby and Halder (2008) constructed a

comprehensive household wealth score based on housing construction material, number of living rooms, type of cooking fuel, mother's education, and household assets. The authors found that respondents from wealthier households in Dhaka, Bangladesh were more likely to report washing hands with soap and that soap was more often observed in those households. In rural Bangladesh, economic status was also an indicator of hand cleanliness among both caregivers and children under the age of 5 (Halder et al., 2010). A nationwide survey conducted in Kenya by Schmidt et al. (2009) confirmed the link between education, socio-economic status, and handwashing practices.

Water collection time. Research has shown that both distance from water source and the amount of water available at a household affect the frequency of handwashing. In a meta-analysis of the association between diarrheal disease and distance from home to water source, Wang and Hunter (2010) found an increase in illness risk with increasing distance of the home from the water source. Pickering and Davis (2012) analysed data from almost 200,000 survey responses in 26 countries and were able to show that the time spent walking to the water source was a significant determinant of under-five child health. It had been assumed that increased accessibility to water is associated with higher volumes of water used , and indeed the authors reported a decrease in water collected once the time taken to collect water exceeded about 5 minutes. When collection time is longer than 30 minutes, water quantities collected are expected to decrease further, down to the bare minimum of water for daily consumption. In sub-Saharan Africa, about one in five households in rural areas needs longer than 30 minutes to make one round trip for water collection (Unicef & World Health Organization, 2011). In rural Burundi, less than 1% of all households have piped water on their premises (World Health Organization & Unicef, 2014).

Self-created contextual factors

Amount of water per person. A safe, reliable, and easily accessible water supply is essential for basic health. For example, mothers in Burkina Faso with access to piped water within their yard were observed to wash hands nearly twice as often as mothers who did not have access to piped water in theirs (Curtis et al., 1995). In a study conducted in Ghana, Scott, Lawson, et al. (2007) found that mothers with a household water connection were twice as likely to wash hands with soap after defecation. Schmidt et al. (2009) even found that having a water source inside the house rather than outside was associated with higher handwashing rates. It has been estimated that a minimum of 7.5 litres of water per person per day is required for consumption (i.e. drinking water and water for food preparation) for most people under most conditions (G.

Howard & Bartram, 2003). This minimum required for drinking and cooking does not include that needed for basic health protection. Additional volumes are required for handwashing, bathing, basic food hygiene, domestic cleaning, and laundry (Hunter et al., 2010).

Soap purchases. To assess the relationship between handwashing frequency and diarrhoea in Pakistan, Luby, Agboatwalla, et al. (2009) used the amount of soap purchased by the households as novel an indirect measure of handwashing frequency. Eighteen months after a handwashing intervention, the soap purchases and diarrhoea experience of intervention households was not significantly different from controls, reinforcing the suggestion that there was no sustained change in habitual handwashing by the intervention. In a five-year follow-up study evaluating a handwashing campaign, Bowen et al. (2013) found that households that had received an intervention reported purchasing more bars of soap per household member and were more likely to have soap at the handwashing station than control households.

Designated location for handwashing. Although results are mixed when looking at the association between a designated location for handwashing and respiratory and diarrhoea symptoms in children below the age of five years (Kamm et al., 2014; Luby & Halder, 2008), some studies have found increased handwashing behaviour in households with a fixed handwashing location (Devine et al., 2012; Scott, Lawson, et al., 2007).

Interactions between fixed and self-created contextual factors

Purchasing soap and the distance to the water source are often discussed as the greatest barriers to handwashing (Luby, Agboatwalla, et al., 2009; Schmidt et al., 2009). Since economic constraints can limit the amount of soap purchased each month, and since the quantity of water available in the household has been shown to be associated with the distance from the water source, we took a closer look at the interaction between household wealth and the amount of money spent on soap per person per month and at the interaction between the time spent collecting water and the amount of water available in the household per person per day.

Objectives

This paper reports findings from a cross-sectional survey providing baseline data for a handwashing behaviour change programme in rural Burundi targeting caregivers of primary school children. We used self-reported handwashing frequency as the main outcome measure in combination with contextual and psychosocial factors. The primary aim of the study was to

investigate the influence of both contextual and psychosocial factors on handwashing frequency to determine the relative contributions of fixed contextual factors, self-created contextual factors, and psychosocial factors. Using hierarchical regression, we first examined whether and how fixed contextual factors were associated with handwashing frequency. Second, we looked at the contribution of self-created contextual factors to explain variance in handwashing frequency when controlling for fixed contextual factors. Third, we examined specific interactions of fixed and self-created contextual factors to see whether soap purchase influences handwashing frequency independent of household wealth and whether the quantity of water available in the household influences handwashing frequencies independent of the time spent collecting water. Lastly, we looked at the relative contribution of psychosocial factors in explaining variance in handwashing frequency beyond contextual factors. Identifying contextual and psychosocial factors that may be related to high handwashing frequency could provide basic data and evidence for campaign implementation strategies to induce and increase handwashing behaviour after contact with faeces and before handling food.

Methods

Participants and procedures

This cross-sectional study provided the baseline for a larger longitudinal study investigating the impact of behaviour change interventions in schools and health centres in Ngozi Province, Burundi. Twenty primary schools with access to water were selected with the assistance of the local rural water agency. One *colline* (village) was randomly selected within each of the schools' catchment areas. The random route procedure was used to select approximately 30 households per *colline* (Hoffmeyer-Zlotnik, 2003). Only households with primary caregivers of a child attending primary school were considered. In total, 671 interviews were conducted with primary caregivers. Primary caregivers were targeted because they are in charge of child care and most food preparation and because they serve as important role models for young children. In most cases, the primary caregiver is the mother, but there are some children for whom the primary caregiver is the father, a grandparent, or the nanny.

The study was conducted between February and March 2014 in 20 villages. Data were collected by a team of 17 interviewers with degrees in health sciences from the Ngozi Province University. To ensure uniform understanding among all data collectors, we provided

a five-day training for interviewers and field supervisors on the purpose and conceptual framework of the study, data collection process, interviewing skills, and the meaning of the questions. The training included practical sessions on interviewing techniques and use of the different data collection tools. The survey instrument was translated into Kirundi and back-translated into French to ensure accuracy of translation, and then pre-tested and revised. Data were collected in electronic form using Open Data Kit software (Hartung et al., 2010) on a tablet device. Interviews with the caregivers lasted about 75-90 minutes. Information about the study was given to all participants, and informed consent was obtained orally.

Measures

The structured interview included questions on handwashing behaviour, sociodemographic characteristics, context factors related to handwashing, and psychosocial determinants from the RANAS model (see Appendix II for a French version of the questionnaire). To measure handwashing behaviour, data collectors asked respondents how often they washed hands at different critical junctures: before eating, before preparing food, and after defecation. Frequencies were assessed on a five-point scale (0 = (almost) never/0-1 times out of 10 to 1 = (almost) always/9-10 times out of 10). A mean score was calculated, with higher scores indicating higher handwashing frequency (Cronbach's alpha = .83).

The fixed contextual factors included the time spent on collecting water (round trip) and socio-economic status. A round trip water collection time of 30 minutes was used as a cut-off value to form two groups for comparison. To measure socio-economic status, a household wealth index was constructed of variables describing household assets; it used the first factor from a principal component analysis (Filmer & Pritchett, 2001; Vyas & Kumaranayake, 2006). It is assumed that the first principal component is a measure of socio-economic status (Houweling, Kunst, & Mackenbach, 2003). We did not include variables on water and sanitary facilities because we were interested in the impact of wealth independent of specific facilities and supplies that might have an effect on handwashing (Houweling et al., 2003). To collate the household wealth index, respondents were asked about household construction material, animal ownership, and ownership of various assets such as radios and bicycles.

Self-created contextual factors included the quantity of water collected per person per day, monthly expenses for soap per person, and the presence of a specific location for washing hands in the home or courtyard identified by the respondent as the location where hands are washed most often. To assess the monthly expenses for soap per person, we used the reported

average amount of money spent on soap per household each month divided by the number of household members. We estimated the volume of water per person by dividing the volume of water collected each day by the number of persons living in the household. We then used the minimum required amount of 7.5 litres of water per person per day for drinking and cooking as a cut-off indicator to distinguish households in which more water than the required minimum for consumption was available from those in which not enough water was available to maintain a good standard of hygiene. The characteristics of all participating households are shown in Table 5.

Table 5. Characteristics of Participating Households

	n	Percent / Mean (*SD*)
Characteristics of the caregiver		
Age	660	38.8 (10.7)
Completed primary school	244	37.0
Married	550	83.3
Household assets included in the wealth index		
Proportion who own		
Electricity	26	3.9
Radio	404	61.2
Television	19	2.9
Bicycle	188	28.5
Car	6	0.9
Motorcycle	20	3.0
Mobile phone	277	42.0
Table	429	65.0
Chair	591	89.5
Bed	639	96.8
Bank account	98	14.8
Watch	222	33.6
Solar panel	11	1.7
Window	164	24.8
House construction material		
Cement floor	40	6.1
Tin roof	194	29.4
Brick walls	569	86.2
Number of livestock owned		
Cows		0.5 (0.9)
Goats		1.4 (2.3)
Sheep		0.1 (0.8)
Pigs		0.4 (0.8)
Rabbits		0.4 (1.3)
Poultries		1.0 (2.5)
Guinea pigs		1.0 (2.7)

Items assessing the psychosocial factors were based on the RANAS model and derived from previous research on handwashing with soap (Contzen & Mosler, 2015) and from studies in the water and sanitation sectors (Huber & Mosler, 2013; Inauen, Tobias, et al., 2013). Subjects were asked four questions to assess knowledge of diarrhoeal disease transmission and preventive measures. One point was given for a correct answer on each item. The final scores were transformed into a value range of 0–1. One item was used to quantify each of perceived vulnerability, perceived severity, and action knowledge. All other psychosocial factors were measured with several items using five-point scales, which were averaged. Example items for each psychosocial factor are presented in Table 6, along with Cronbach's alpha internal reliability coefficients. Variables were coded so that higher scores were more favourable to the behaviour. To facilitate interpretation of unstandardized regression coefficients, all items were transformed into a value range of 0-1.

Table 6. Descriptive Statistics of Psychosocial Factors

Factors	Description	Example item	No. of items	α
Perceived vulnerability	Subjective perception of the risk of contracting a disease	Considering your usual handwashing practices, how high do you feel is the risk that you get diarrhoea? (inverted)	1	
Perceived severity	Subjective perception of the seriousness of the consequences of a disease	Imagine you contracted diarrhoea, how severe would be the impact on your daily life?	1	
Health knowledge	Knowledge about the symptoms of a disease and how to prevent it	Can you tell me what causes diarrhoea?	3	
Cost beliefs	Perceived negative aspects of engaging in a behaviour	How effortful do you think is it to always wash hands with soap and water at critical junctures? (inverted)	7	.80
Benefit beliefs	Perceived positive aspects of engaging in a behaviour	How certain are you that always washing hands with soap and water at critical junctures prevents you from getting diarrhoea?	2	.77
Affective beliefs	Beliefs concerning the feelings associated with performing the behaviour	How much do you like washing hands with soap and water?	5	.72
Social norms	Perceptions of other peoples' actions and opinions	How many people of your household always wash hands with soap and water at critical junctures?	3	.75
Action knowledge	Knowledge about how to practice a behaviour	What are the different steps to correctly wash hands?	1	
Self-efficacy	Belief in the abilities to perform a certain behaviour	How certain are you that you can always wash your hands with soap and water at critical junctures?	5	.86
Action planning	Specification of when, where and how to perform a behaviour	Do you plan a quantity of water you have to collect for handwashing with soap and water?	8	.77
Action control	Self-monitoring and effort to continuously evaluate ongoing behaviour	How much do you pay attention to always have soap at home to wash hands with soap and water at critical junctures?	5	.93
Remembering	Ease of remembering to perform a behaviour at specific moments	How often does it happen that you forget to wash your hands with soap and water at critical junctures? (inverted)	2	.63
Commitment	Subjective importance of the behaviour	How important is it for you to always wash hands with soap and water at critical junctures?	9	.80

Data analysis

We performed hierarchical regression analyses to determine which contextual factors and which psychosocial factors contribute to the explanation of handwashing frequencies. In these analyses, age, marital status, and education were entered as control variables in the first step of the model. In the next, the two fixed contextual factors were entered, followed by the self-created contextual factors. We then tested whether the relationship between self-created contextual factors and handwashing frequencies were moderated by fixed contextual factors by combining characteristics of hypothesized interactions. We entered the interaction of time spent collecting water with the amount of water and the interaction of household wealth and soap expenses in the regression model after the fixed and self-created contextual factors had been entered. The variables included in the interaction term were centred around their mean before computing the cross-products to reduce collinearity between the main effect variables and the interaction terms (Jaccard & Turrisi, 2003). If we did not find an interaction effect, we excluded the interaction term from the model to be parsimonious. In the last step, the psychosocial factors were entered as predictors into the regression model. For all regression analyses, confidence intervals were estimated using a bootstrap approach with 5,000 samples. Where potential predictor variables were highly correlated ($r > .80$) and conceptually similar, only the variable that correlated most strongly with the dependent variable was included in the regression model to avoid strong multicollinearity between explanatory variables (Gujarati, 2004). Residual analyses were performed to determine significant points of influence in the final models. Three individuals were excluded from the analyses, as they were identified as influential and high leverage points. The exclusion of outliers did not alter the significance of the results but did tend to reduce the magnitude of the main effects. Eight records with missing values were excluded from our analysis, yielding a final sample of 660. Analyses of the variance inflation factors (VIFs) indicated that multicollinearity was not a problem in the regression equations (all VIFs < 4.0). Though caregivers were nested within villages, no multilevel analyses were conducted because there was no significant between-subject variance for the outcome variable; the intraclass correlation was less than 2%. All analyses were conducted with IBM SPSS Statistics for Windows, Version 21.0. (Armonk, NY: IBM Corp.).

Ethics

This study was approved by the National Ethics Committee of Burundi (Comité National d'Éthique pour la protection des êtres humains participants à la recherche biomédicale et comportementale) and by the ethical review committee of the Faculty of Arts, University of Zurich.

Results

Descriptive statistics

The characteristics of all participating households are shown in Table 5. Of all respondents, over 99% were female and only 37.0% had completed primary school. Participant ages ranged from 16 to 75 years, with the majority of participants aged between 30 and 50 (70%) (M = 38.8 years, SD = 10.7). Most primary caregivers were married (83.3%); the remaining respondents were either widowed, single, cohabiting, or divorced or separated. More than half (61.2%) of the households had a radio, and someone owned a mobile phone in less than half of the households (42.0%). Twenty-four indicators were included in the principal component analysis to create the household wealth index (see Table 5). The household characteristics that explained the most variance among households were whether or not a person in the household had a bank account or a mobile phone. The first principal component retained 15.0% of the total data variability.

Means and standard deviations for all measures are provided in Table 7. Primary caregivers reported washing hands with soap slightly more than half of the time at critical junctures (M = 0.66, SD = 0.22). A total of 183 respondents (27.7%) of all households reported spending more than 30 min per round trip to collect water, and in 247 households (37.4%), respondents reported that less than the recommended 7.5 litres of water per person per day were available. On average, households spent 498 BIF (0.31 USD) per person per month on soap. At the time of the survey in 2014, 1000 Burundi Franc (BIF) equalled 0.64 US Dollar (USD). The survey revealed medium knowledge about the causes of diarrhoea and how to prevent the disease (M = 0.45, SD = 0.23) and medium knowledge about the critical junctures when to wash hands with soap and water (action knowledge, M = 0.47, SD = 0.31).

Table 7. Descriptive Statistics and Correlations for Handwashing Frequency and Predictor Variables (N = 660)

	Variable	*M*/*n*	*SD*/%	Pearson Correlations																
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Handwashing frequency	0.66	0.22																		
2	Household wealth	1.86	1.41	**.28**																	
3	Water collection > 30 min[a]	183	27.7%	-.03	**-.12**[b]																
4	LCD ≥ 7.5[a]	247	37.4%	**.23**	**.31**	**-.12**[b]															
5	Soap expenses (in USD)	0.31	0.20	**.17**	**.26**	-.07	**.33**														
6	Designated HW location[a]	125	18.9%	**.21**	**.20**	.04	.03	**.08**[c]													
7	Perceived vulnerability	0.60	0.22	**.11**[b]	**.14**	-.01	**.08**[c]	.04	**.18**												
8	Perceived severity	0.84	0.17	**.10**[b]	.07	**.08**[c]	.01	.02	.07	.01											
9	Health knowledge	0.45	0.23	**.21**	**.18**	-.03	.07	**.18**	**.09**[c]	**.09**[c]	**.31**										
10	Cost beliefs	0.82	0.15	**.38**	**.18**	-.03	**.19**	**.15**	.05	**.23**	**.13**[b]	**.20**									
11	Benefit beliefs	0.76	0.14	**.35**	**.13**[b]	-.05	**.09**[c]	**.11**[b]	.06	-.04	**.20**	**.38**	**.23**								
12	Affective beliefs	0.76	0.11	**.49**	**.20**	-.05	**.11**[b]	**.13**	**.12**[b]	.03	**.30**	**.26**	**.32**	**.54**							
13	Social norms	0.69	0.19	**.52**	**.15**	-.02	**.11**[b]	**.13**	**.11**[b]	.02	**.13**	**.09**[c]	**.22**	**.38**	**.45**						
14	Action knowledge	0.47	0.31	**.33**	**.22**	-.01	**.09**[c]	**.20**	**.09**[c]	**.12**[b]	**.19**	**.58**	**.28**	**.37**	**.35**	**.22**					
15	Self-Efficacy	0.70	0.14	**.67**	**.33**	**-.13**[b]	**.23**	**.21**	**.15**	.07	**.17**	**.23**	**.44**	**.54**	**.62**	**.64**	**.38**				
16	Action Planning	0.47	0.27	**.18**	**.11**[b]	.05	-.07	.01	**.38**	**.19**	.04	**-.09**[c]	-.04	-.07	-.04	**.13**	**-.14**	.06			
17	Action Control	0.72	0.15	**.65**	**.26**	**-.09**[c]	**.20**	**.18**	**.11**[b]	.02	**.23**	**.26**	**.40**	**.57**	**.66**	**.64**	**.34**	**.85**	.07		
18	Remembering	0.74	0.20	**.44**	**.14**	-.01	**.19**	.04	**.12**[b]	**.26**	**.10**[c]	**.13**[b]	**.42**	**.14**	**.28**	**.27**	**.20**	**.41**	**.12**[b]	**.35**	
19	Commitment	0.72	0.11	**.47**	**.23**	**-.09**[c]	**.11**[b]	**.17**	.03	**-.09**[c]	**.23**	**.27**	**.24**	**.61**	**.64**	**.52**	**.34**	**.70**	-.01	**.73**	**.21**

Note. *SD* = standard deviation. LCD = Litres per Capita per Day. U*SD* = U.S. Dollar. HW = Handwashing. Handwashing frequency and all psychosocial variables ranged from 0 to 1. Water collection > 30 min = 1, below 30 min = 0. LCD ≥ 7.5 = 1, below 7.5 litres = 0. Designated HW location = 1, no designated location = 0. [a] For Water collection > 30 min, LCD ≥ 7.5 and Designated HW location percentages are presented instead of means and correlations are point biserial correlations. Boldface: significant with $p < .001$, except for those marked with [b] $p < .01$; [c] $p < .05$.

Scores on action planning, that is, planning when, where, and how to wash hands, were also below the scale midpoint (M = 0.47, SD = 0.27). Highest scale scores were observed for the perceived severity of the consequences of catching diarrhoea (M = 0.84, SD = 0.17), and for cost beliefs (M = 0.82, SD = 0.15), whose scores were inverted so that high values reflected favourable attitudes (i.e. low perceived effort/time).

Multivariate model and interactions

Except for the time spent collecting water, all predictor variables were significantly correlated with handwashing frequency (see Table 7). Bivariate analyses showed that intercorrelations among predictor variables were all below .80, except for the bivariate correlation between action control and self-efficacy (r = .85, p < .001). Since self-efficacy correlated most strongly with handwashing frequency, the scores for action control were omitted from the multivariate analyses to avoid multicollinearity. We conducted a hierarchical linear regression analysis to examine the specific predictive power of fixed and self-created contextual factors and psychosocial factors on handwashing frequency after we controlled for differences in individual characteristics including age, education, and marital status. Entering age, education, and marital status in the first step of the analysis did not reveal significant prediction for handwashing frequency (R^2 = .00; F(3, 656) = 0.04; p = .99). These variables were therefore removed from all further analyses.

When the fixed contextual factors household wealth and water collection time were considered as predictors of handwashing frequency, only household wealth emerged as significant (b = 0.044, SE = 0.006, p < .001) (see Step 1 in Table 8). Thus, higher scores on the household wealth index were predictive of higher reported handwashing frequency, whereas having a round trip water collection time exceeding 30 min did not have an effect on the reported frequency. The two fixed contextual factors accounted for 8% of the variation in reported handwashing frequency (F(2,657) = 27.50, p < .001). Introducing the self-created contextual factors explained an additional 5% of variation in handwashing frequency, and this change in R^2 was significant (F change(3,654) = 12.82, p < .001) (see Step 2 in Table 8). We found the having more than the recommended 7.5 litres per person per day available (b = 0.067, SE = 0.016, p < .001) and having a designated location for handwashing (b = 0.092, SE = 0.019, p < .001) had a significant impact on handwashing frequency, whereas the amount of money spent on soap per person per month did not affect frequency. Household wealth remained a significant predictor.

Table 8. Summary of Hierarchical Regression Analysis for Variables Predicting Handwashing Behaviour

	b	SE *b*	*p*	CI (95%)		ß	R^2	Δ R^2	Δ *F*
				LL	UL				
Step 1							.08	.08	27.50***
Household wealth	0.044	0.006	.000	0.032	0.055	.28			
Water collection > 30 min	0.003	0.019	.883	-0.034	0.039	.01			
Step 2							.13	.05	12.82***
Household wealth	0.029	0.006	.000	0.018	0.041	.19			
Water collection > 30 min	0.005	0.018	.784	-0.032	0.040	.01			
LCD ≥ 7.5	0.067	0.016	.000	0.034	0.099	.15			
Soap expenses	0.063	0.047	.178	-0.025	0.159	.06			
Designated HW location	0.092	0.019	.000	0.053	0.130	.16			
Step 3							.54	.41	47.67***
Household wealth	0.004	0.005	.364	-0.005	0.013	.03			
Water collection > 30 min	0.020	0.014	.153	-0.008	0.047	.04			
LCD ≥ 7.5	0.034	0.014	.015	0.007	0.062	.08			
Soap expenses	-0.012	0.034	.733	-0.077	0.057	-.01			
Designated HW location	0.024	0.017	.161	-0.010	0.059	.04			
Perceived vulnerability	-0.031	0.031	.321	-0.093	0.030	-.03			
Perceived severity	-0.096	0.035	.005	-0.163	-0.028	-.07			
Health knowledge	0.047	0.034	.172	-0.020	0.113	.05			
Cost beliefs	0.097	0.049	.047	0.003	0.195	.06			
Benefit beliefs	-0.063	0.062	.315	-0.187	0.057	-.04			
Affective beliefs	0.270	0.094	.005	0.084	0.453	.13			
Social norms	0.159	0.051	.002	0.059	0.258	.13			
Action knowledge	0.047	0.026	.076	-0.005	0.099	.07			
Self-Efficacy	0.631	0.089	.000	0.453	0.808	.39			
Action Planning	0.112	0.026	.000	0.061	0.163	.14			
Remembering	0.159	0.038	.000	0.082	0.233	.14			
Commitment	-0.017	0.102	.879	-0.224	0.181	-.01			

Note. SE = Standard Error. CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit. LCD = Litres per Capita per Day. HW = Handwashing. All psychosocial variables ranged from 0 to 1. Water collection > 30 min = 1, below 30 min = 0. LCD ≥ 7.5 = 1, below 7.5 litres = 0. Designated HW location = 1, no designated location = 0. 95% Confidence intervals and standard errors are based on 5000 bootstrap samples.

To assess the potential interaction between household wealth and the amount of money spent on soap and between the time spent collecting water and the quantity of water available in the household, we included the interaction terms into the linear model. The nonsignificant interaction terms indicated that the amount of money spent on soap per person per month appeared to influence handwashing frequency independently of household wealth (b = -0.040, SE = 0.032, p = .209) and that respondents whose water collection time was below 30 min and who had more than 7.5 litres of water per person available every day did not report higher handwashing frequency (b = 0.039, SE = 0.036, p = .285). As both interactions proved not be statistically nonsignificant and did not explain additional variance (R^2 = .13; F change(2, 652)

= 2.36; p = .095), they were removed from the model for the sake of parsimony, with no consequences for the values of other variables.

Finally, the addition of the psychosocial factors to the regression model explained an additional 41% of the variation in handwashing frequency, and this change in R^2 was also significant (F change(12, 642) = 47.67, p < .001) (see Step 2 in Table 8). As indicated by the standardized regression coefficients, the most important predictor of handwashing frequency in the final model was self-efficacy (ß = .39, p < .001), followed by action planning (ß = .14, p < .001) and remembering (ß = .14, p < .001). Together, the contextual and the psychosocial factors accounted for 54% of the variance in self-reported handwashing frequency. When all the psychosocial factors were included in the regression model, having at least the recommended 7.5 litres per person per day available remained significant in explaining handwashing frequency (ß = .08, p = .015). Neither household wealth nor having a designated location for handwashing remained significant predictors, indicating that the effects of household wealth and having a designated location for washing hands on handwashing frequency were mediated through one or more psychosocial factors. Surprisingly, perceived severity had a negative sign in the prediction of handwashing frequency, while the zero-order correlation between perceived severity and handwashing frequency was positive (r = .11). This change in direction of the relationship occurs when one or more confounding variables obscure the direction of the predictor-criterion relationship (Smith, Ager, & Williams, 1992). Rosenberg (1968) introduced the concept of 'correction for distortion' to describe this reversal in sign. We performed a series of regression analyses using various combinations of the different factors as predictors to identify which variable or variables affected the change in the direction of association. The analyses revealed affective beliefs, self-efficacy, and commitment as variables that affected the change of the direction between perceived severity and handwashing frequency. Moreover, cost beliefs and social norms in combination with benefit beliefs induced a reversal in sign, as did remembering in combination with perceived vulnerability, health knowledge, and benefit beliefs, implying that a complex pattern of factors influence the direction of the effect of perceived severity on handwashing frequency.

Discussion

Understanding the degree to which contextual and psychosocial factors are related to handwashing behaviour is important for improving intervention programming. Using the concepts of contextual and psychosocial dimensions represented in the IBM-WASH

framework (Dreibelbis, Winch, et al., 2013), we investigated the relative contribution of fixed contextual factors, self-created contextual factors, and psychosocial factors on the variation of handwashing frequency among caregivers of primary school children in rural Burundi. To the authors' knowledge, this is the first study to examine the contributions of psychosocial factors to handwashing behaviour beyond contextual factors.

We found that all factors showed a significant bivariate association with handwashing frequency except for the time spent collecting water. All factor groups entered stepwise in the regression model contributed significantly to the variation of handwashing frequency. One noteworthy finding is that household wealth and having a designated location for handwashing lost their influence when the psychosocial variables were entered into the regression. Even though the psychosocial factors mediated part of the effect of having more than the recommended 7.5 litres of water per person available on handwashing frequency, this self-created contextual factor remained a significant predictor in the final model. Having to spend more than 30 min for water collection per round trip did not significantly influence handwashing frequency. In the multivariate analysis, self-efficacy was found to be the main determinant of handwashing frequency, followed by high affective beliefs and high social norms.

Sociodemographics

In our study, reported handwashing frequency was independent of sociodemographic factors including age, level of education and marital status. Two recent studies suggest that increasing levels of education and older age are significantly associated with self-reported handwashing behaviour (Tao et al., 2013; Tüzün, Karakaya, & Deniz, 2015). Likewise, a study conducted in Burundi found a lower incidence of diarrhoea in children whose primary caregivers were aged 40 or older (Diouf, Tabatabai, Rudolph, & Marx, 2014). However, many studies have not been able to find an association with age or education of the mother and the prevalence of diarrhoeal diseases in young children (Al-Mazrou, Aziz, & Khalil, 1991; Moy, Booth, Choto, & McNeish, 1991; Seksaria & Sheth, 2014). Obviously, many differences in background characteristics of the respondents, including racial, gender, and age differences and many differences in study design and statistical approach make study-to-study comparisons difficult. Nevertheless, the results of our study suggest that reported handwashing frequencies do not differ between young and old caregivers, between caregivers who have completed primary school and those who have not, and between caregivers who are married and those who are either single, separated, divorced, or widowed. Indeed, due to the limited

employment opportunities in rural areas of Burundi, with local economies based on agriculture and stock-breeding, households are very similar in their standards of living, regardless of the mother's educational attainment or civil status.

Soap expenses

The cost of soap has frequently been mentioned as a barrier to handwashing with soap in low-income Bangladeshi communities (Zeitlyn & Islam, 1991), and Ghanaian mothers have mentioned the expense of soap as limiting consistent handwashing behaviour (Scott, Lawson, et al., 2007). On the other hand, Scott, Lawson, et al. (2007) could not find a statistically significant relationship between the affordability of soap and observed handwashing. Moreover, among those already washing hands with soap, lack of soap was not perceived as a barrier, regardless of economic status. In our sample, households spent about 0.31 USD per person per month on soap. On average, in Burundi in 2005, people were living on less than 30 USD per month (World Bank 2005), thus spending about 1% of their income on soap. In our study, soap purchase did not have a significant effect on handwashing frequency, and its influence on handwashing frequency was even further reduced by including psychosocial factors in the model. As soap is most often used for washing clothes, the amount of money spent on soap might indeed not reflect caregivers' use of soap for washing hands at critical junctures. Moreover, in rural Burundi, soap for washing hands if often referred to as a luxury, is thus often only used if hands are visibly dirty, and is to be bought sparingly and conserved carefully, especially for formal occasions, such as going to church on Sunday or attending other social events. Nonetheless, a behaviour-change campaign increasing the value of soap and encouraging its purchase for washing hands could motivate households to overcome this seemingly rather perceived cost barrier than actual barrier.

Wealth index

When all fixed and self-created contextual factors were included in the model, a high score on the household wealth index was a significant predictor for high handwashing frequency. This relationship between wealth and different handwashing indicators has been found in prior studies (Gorter et al., 1998; Luby & Halder, 2008; Ram et al., 2010; Sakisaka et al., 2002; Schmidt et al., 2009). Even though indicators of handwashing are commonly strongly associated with measures of socio-economic status, some studies were not able to confirm this association (Halder et al., 2010) or to link socio-economic status to lower diarrhoea prevalence (Mekasha & Tesfahun, 2003; Moy et al., 1991). As Ram et al. (2014) suggested,

compared to poor households, wealthier households may be able to purchase soap more regularly and may be able to prioritize the use of soap for handwashing over other purposes. In the present sample, we could not find a stronger relationship between the amount money spent on soap and handwashing frequency when respondents had a higher score on the household wealth index than when this score was low. Moreover, when including psychosocial factors in the model, household wealth was not predictive of reported handwashing frequencies anymore, indicating that respondents' risk perceptions, attitudes, beliefs, abilities, and self-regulation wholly explained the effect of household wealth on handwashing frequency. These results may be able to explain the lack of consistency in the effects of household wealth on handwashing behaviour and suggest that intervention programs should focus on psychosocial factors.

Water collection time

Whether people had to spend more than 30 min per round trip to collect water or not made no difference to their reported handwashing frequency. The existing literature on water access and handwashing has largely focused on households with access to piped water connections. Most studies found that handwashing rates increased if the household had a water connection (Curtis et al., 1995; Schmidt et al., 2009; Scott, Lawson, et al., 2007), while at least one other could not find this association (Biran et al., 2014). Once water is sourced outside the compound, no association between handwashing behaviour and distance from sources of water has been found (Omotade et al., 1995; Scott, Lawson, et al., 2007). In a multi-country study examining the relationship between the health of children and the distance to water, Esrey, Potash, Roberts, and Shiff (1991) found a significant difference between incidence of diarrhoea in rural areas when comparing the longest to the briefest round trip water collection times, but not when comparing the intermediate and briefest groups. Pickering and Davis (2012) found that the time spent walking to the water source was a significant determinant of under-five child health. The lack of association between the time spent collecting water and reported handwashing practices in our study might also be due to the breakdown of the sample into two groups, that is water collection time above 30 min per round trip and below 30 min, which may have hindered the detection of an effect of time spent collecting water on handwashing practices. Although a number of studies suggest that access to water may play an important role in reducing childhood diarrhoea, there is a need for better designed studies to further elucidate the impact of the distance from water sources on hygiene practices and health (Wang & Hunter, 2010).

Amount of water per person

Caregivers who reported procuring more than 7.5 litres of water per person per day also reported higher handwashing frequency. Gilman et al. (1993) found that households that used more water also washed hands more often at critical junctures, and several studies have shown that access to running water in the household compound increases handwashing rates (Curtis et al., 1995; Schmidt et al., 2009; Scott, Lawson, et al., 2007). We did not take account of an existing water connection in the household compound, because less than 3% of all households in our study were connected to running water. Evidence for the amount of water that is needed for drinking, cooking, and hygienic purposes is inconclusive (De Buck, Borra, De Weerdt, Veegaete, & Vandekerckhove, 2015). The recommended amount of water per person per day for basic human needs including drinking water, hygiene, sanitation services, and preparing food varies between 15 and 50 litres (Batteson, Davey, & Shaw, 1998; Gleick, 1996; Spiegel, Sheik, Gotway-Crawford, & Salama, 2002). We therefore used the cut-off of 7.5 litres of water required for consumption recommended by the World Health Organization (G. Howard & Bartram, 2003), which does not take into account the amount of water required for hygiene. Our results indeed suggest that handwashing practices are more frequent in households exceeding this minimum amount for consumption. We considered the amount of water per person available at household level to be a self-created contextual factor. It might thus have been reasonable to assume that the effect of this self-created contextual factor on handwashing frequency would be reduced after controlling for the psychosocial factors. Nonetheless, the amount of water available per person per day seemed to influence reported handwashing frequency even when considering the caregivers' attitudes and beliefs on handwashing behaviour, reinforcing the assumption that water is first of all used for consumption and washing clothes and that using water for handwashing purposes is of secondary importance. The lack of any interaction between the time spent collecting water and the amount of water available at household level is in agreement with more detailed studies on the relationship between the distance from the water source and the amount of water brought into the household (Esrey et al., 1991; Kupka, Nižetič, & Reinhards, 1968; West et al., 1989). The average amount of water used seems to be unaffected by the distance the water has to be carried. Apparently, unless water is immediately available within the compound, from a tap or a well, the distance to the source is not important. Nonetheless, access to the water supply should be as close to the home as possible, in order to foster the use of larger amounts of water for hygiene practices (Esrey et al., 1991), especially since

increasing the volume of water used to rinse hands has been found to significantly reduce hand contamination (Hoque, 2003).

Designated location for handwashing

Having a designated location to wash hands at home significantly predicted handwashing frequency, thus confirming the results from several studies that found hand hygiene practices to be more frequent in households with a fixed handwashing location (Biran et al., 2005; Devine et al., 2012; Scott, Lawson, et al., 2007). Overall, less than 20% of all caregivers indicated having a designated location for washing hands. This might be due to the absence of cemented floors inside and outside houses, resulting in the habit of washing hands right next to the water storage containers. In our study, we did not assess the presence of soap and water at this location, which several studies have found to be a good predictor for handwashing behaviour and infectious disease reduction (Luby & Halder, 2008; Luby, Halder, et al., 2009). Future research should consider including the presence of soap and water for handwashing when evaluating the importance of a dedicated handwashing location on handwashing behaviour. The fact that the association between having a designated location for handwashing and reported handwashing frequency was reduced when the psychosocial factors were included in the regression model indicates that the effect of this self-created contextual factor on handwashing frequency was mediated by the psychosocial variables. This confirms the assumption of Luby, Halder, et al. (2009) that having a designated location to wash hands with soap and water present, while not an independent facilitator, is a manifestation of the intention to wash hands. As Contzen et al. (2015) concluded after the evaluation of an intervention promoting handwashing infrastructure, having a designated location eases behaviour performance, serves as a reminder, and enhances social norms. The findings thus strongly suggest that encouraging households to decide on a specific location for washing hands would result in more handwashing with soap.

Psychosocial factors

Our results indicate that high handwashing frequency is much more likely in people who are certain that they can always execute the behaviour at critical junctures, who plan when, where, and how to wash hands, and who do not forget to wash hands at critical junctures. This corroborates recent findings that social-cognitive factors are highly predictive of handwashing frequency (Contzen & Mosler, 2015). Contzen et al. (2015) found disgust, norms, motivational self-efficacy, perceived impediments, coping planning, and commitment

consistently explained both stool-related and food-related handwashing in Haiti and Ethiopia. We did not distinguish between food-related handwashing, that is, handwashing before eating and before preparing food, and stool-related handwashing, that is, handwashing after defecation. Because the respondents' answers showed no disparities between these two behaviours, either in reported handwashing behaviour, or in the psychosocial factors, all measures were combined. Regardless of contextual factors, the psychosocial variables included in our questionnaire revealed that caregivers who indicated a high degree of self-efficacy in always executing the behaviour at critical junctures also reported the highest handwashing rates.

Limitations

While this study provided information about contextual and psychosocial variables pertaining to handwashing frequency, the findings should be interpreted with some limitations in mind. All measures were assessed using self-report. We did not use other methods to assess handwashing behaviour, firstly because our resources were too limited to carry out sufficient direct observations and secondly because of the questionable validity of measuring handwashing behaviour through hand microbiology and other proxies (Biran et al., 2008; Halder et al., 2010; Luby, Halder, Huda, Unicomb, & Johnston, 2011; Ram et al., 2010; Ram et al., 2014). Over-reporting bias for handwashing frequency is very likely. However, the goal of the study was not to report and analyse absolute handwashing rates but to assess the relative impact of the different contextual and psychosocial factors on handwashing frequency. Using the amount of money spent on soap as an indicator of soap availability at household level is difficult, as soap is used for many other behaviours, and the price of a bar of soap varies from brand to brand and location to location. Nevertheless, we would expect more soap purchase in households with higher handwashing rates, especially since the choice of soap brands is extremely limited, and the price of one bar does not vary much by location in Ngozi Province. Another limitation is that the study population was restricted to 20 *collines* in rural Burundi. Determinants of handwashing and their interactions may be different in other settings. However, the study examined a high-need population in rural Burundi. The study was exploratory, aiming at hypothesis generation, and the conclusions should be viewed as preliminary. It was a cross-sectional study on the factors influencing caregivers' handwashing frequency, and causality relationships could not be determined. Additional research on contextual and psychosocial factors influencing behaviour is required to provide more information and evidence with which to design effective health programmes to promote

behaviour change. A range of factors that would be of interest to explore were not included; these include climate, access to markets, and household structure, and their relation to additional indicators for handwashing, especially structured observation, We believe, however, that despite these limitations the work is a good point from which to start investigating the influence of and interaction between different contextual and psychosocial factors on handwashing with soap with the goal of designing more effective handwashing promotion programmes in rural settings.

Conclusion

Up until now, little research has been conducted on the relevance of psychosocial factors on handwashing behaviour, and more importantly, the reciprocity of contextual and psychosocial factors has largely been neglected. The full and partial mediation effects of contextual factors through psychosocial factors are examples of the potential impact of interactions between these factors on handwashing frequency. It seems likely that contextual constraints are perceived rather than actual barriers. These are interesting findings which merit further investigation and suggest researchers should include both contextual factors and psychosocial factors when trying to understand handwashing frequency among caregivers. Our results are consistent with behaviour change theories and health promotion approaches that stress the importance of a physical environment enabling and facilitating the desired behaviour (McLeroy et al., 1988; Sallis et al., 2008; Stokols, 1992b). A model including contextual and psychosocial factors is more comprehensive in explaining behaviour formation. Moreover, the findings emphasize the role of psychosocial factors, such as attitudes, beliefs, and abilities, on creating and maintaining health-promoting environments. The high importance of psychosocial factors on handwashing behaviour beyond contextual factors should be considered for health education and policy.

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Chapter IV

Identifying behavioural determinants for interventions to increase handwashing practices among primary school children in rural Burundi and urban Zimbabwe

Elisabeth Seimetz, Jurgita Slekiene, Max Friedrich, & Hans-Joachim Mosler

Abstract

Objectives. This article presents the development of a school handwashing programme in two different sub-Saharan countries that applies the RANAS (risk, attitudes, norms, ability, and self-regulation) systematic approach to behaviour change.

Methods. Interviews were conducted with 669 children enrolled in 20 primary schools in Burundi and 524 children in 20 primary schools in Zimbabwe. Regression analyses were used to assess the influence of the RANAS behavioural determinants on reported handwashing frequencies.

Results. The results revealed that, in both countries, a programme targeting social norms and self-efficacy would be most effective. In Burundi, raising the children's perceived severity of the consequences of contracting diarrhoea, and in Zimbabwe, increasing the children's health knowledge should be part of the programme.

Conclusions. The school handwashing programme should create awareness of the benefits of handwashing through educational activities, raise the children's ability and confidence in washing hands at school through infrastructural improvements, and highlight the normality of washing hands at school through events and poster creation.

Key words: Handwashing with soap; Diarrhoea; Behavioural determinants; Campaign development; School children; sub-Saharan Africa

Introduction

Handwashing promotion programs are increasingly being implemented in developing countries to improve child health and development. Since schools are important settings for disease transmission, school-based interventions aiming at mitigating communicable diseases are likely to reduce the overall community disease burden (Cairncross, Blumenthal, Kolsky, Moraes, & Tayeh, 1996; Mikolajczyk, Akmatov, Rastin, & Kretzschmar, 2008). According to the WHO/Unicef Integrated Global Action Plan for Pneumonia and Diarrhoea (2013), improving access to safe drinking water, providing adequate sanitation, and promoting good hygiene behaviour, such as handwashing with soap, are essential for preventing diarrhoea. In primary schools, interventions promoting handwashing with soap have proven to be effective in reducing infectious diseases in pupils (Bowen et al., 2007; Patel et al., 2012; Talaat et al., 2011), Potential constraints include lack of soap and water and the absence of adequate handwashing facilities (Dreibelbis, Greene, et al., 2013; Freeman et al., 2012; Greene et al., 2012; Saboori et al., 2013). Increasing the provision of soap and water for handwashing has caused decreases in absenteeism (Blanton et al., 2010; Bowen et al., 2007; Migele, Ombeki, Ayalo, Biggerstaff, & Quick, 2007), and several studies have reported an association between proper handwashing behaviour and the availability and accessibility of handwashing facilities (Monney et al., 2014; Setyautami et al., 2012; Steiner-Asiedu et al., 2011).

For handwashing behaviour to be adopted and become a habit, it is not enough to provide proper resources and facilities. Growing evidence suggests that health behaviours such as dietary habits, physical activity patterns, and substance abuse are predicted by such social-cognitive factors as attitude, subjective norms, and self-efficacy beliefs (Conner, Kirk, Cade, & Barrett, 2001; Rhodes, Plotnikoff, & Courneya, 2008; Scholz, Nagy, Göhner, Luszczynska, & Kliegel, 2009). Several studies have indicated that hand hygiene practices depend largely on psychological factors within the individual (Curtis et al., 2011; Lopez-Quintero et al., 2009; Scott, Lawson, et al., 2007). So far, very few studies have investigated behavioural determinants underlying children's handwashing practices. Two studies have drawn on the theory of planned behaviour to examine factors affecting proper handwashing. Research by Lopez-Quintero, Freeman, and Neumark (2009) in Colombia showed that intentions to perform proper handwashing were determined by perceived control, personal attitudes, and subjective norms. Setyautami et al. (2012) found that students with positive attitudes and perceived behavioural control were twice as likely to wash their hands properly. Several studies have used the knowledge, attitudes, and practices approach to examine the influence

of school children's knowledge, attitudes, and practices on hygiene behaviour; they have reported mixed results concerning the importance of knowledge in determining proper handwashing behaviour (Grimason et al., 2014; Monney et al., 2014; Vivas et al., 2010; Yalçın et al., 2004). Although attitude was mentioned as an important indicator for hygiene behaviour in all of these studies, it was not assessed above and beyond knowledge and practice. More importantly, self-regulatory processes such as action control and feelings of self-efficacy have not yet been investigated.

Researchers urge the use of theories of behaviour change for developing interventions and programs to change health behaviour (Aboud & Singla, 2012; Michie & Johnston, 2012). Promoting proper handwashing practices is challenging, and the effectiveness of handwashing interventions have been inconsistent (Vindigni, Riley, & Jhung, 2011). Applying behaviour change theories to promotion programs for handwashing may increase their potential for changing behaviour (Al-Tawfiq & Pittet, 2013). So far, to the best of our knowledge, no study has used social cognition models from the realm of health psychology to design data-driven handwashing programs in primary schools in developing countries. In this study, Mosler's RANAS (risk, attitudes, norms, ability, and self-regulation) approach to behaviour change (Mosler, 2012) served as theoretical framework to measure the behavioural determinants underlying handwashing with soap among primary school children. The model suggests that people's behaviour is determined by their risk perception, their attitudes toward a behaviour, their beliefs concerning the advantages or disadvantages of adopting or not adopting the behaviour, normative beliefs, perceived self-efficacy, resources, and skills necessary to perform the behaviour. The RANAS blocks assimilate factors from different theories of social and health psychology, such as the theory of planned behaviour (Ajzen, 1991) and the health action process approach (Schwarzer, 2008), that have been shown to successfully explain and change many types of health behaviour. The RANAS approach provides an analytical tool to analyse the different determinants of behaviour on the basis of quantitative data. Mosler (2012) suggests targeting the determinants with the highest intervention potential, that is, determinants with low mean scores and high predictive values on the behaviour within the target population. The corresponding behaviour change techniques are then selected to develop appropriate practical strategies for intervention programs (Albarracín et al., 2005; Bartholomew et al., 2006; Michie et al., 2008). Several studies have successfully applied the RANAS approach for different health-related behaviours, including handwashing (Contzen et al., 2015), in the water and sanitation sector in developing countries and have shown the added value of implementing data- and theory-based interventions compared to information

interventions alone (Huber et al., 2014; Inauen & Mosler, 2014; Tamas, Tobias, & Mosler, 2009).

This study uses the RANAS social cognition model of health behaviour to analyse data gathered from surveys of primary school children in two countries regarding the behavioural determinants of the children's handwashing practices. The aim of the present paper is to describe a psychological approach to designing a handwashing programme using data collected from study participants, theory, and empirical evidence from the literature. The study addresses two main research questions: 1) Which behavioural determinants are related to self-reported handwashing frequencies after using the toilet at school and what is their improvement potential? 2) What theory-based behaviour change techniques can be directed at these behavioural determinants to generate changes in behaviour? Information from this study will serve as baseline data for future campaign development and policy action for an effective school-based handwashing intervention programme.

Methodology

Data Collection and Participants

The cross-sectional study was conducted in rural parts of the province of Ngozi in the north of the Republic of Burundi and in urban suburbs of Harare, the capital of the Republic of Zimbabwe. In Burundi, 20 primary schools with access to water were identified, and within each of the schools' catchment areas one *colline* (village) was randomly selected for the interviews to take place. In Zimbabwe, 20 primary schools with geographically distinct catchment areas in high-density suburbs of Harare were selected. All households were randomly selected using a random route procedure (Hoffmeyer-Zlotnik, 2003), and only households with at least one child attending primary school were considered. Face-to-face interviews with primary school-aged children took place in Burundi from mid-February to mid-March, 2014. In Zimbabwe, children were interviewed at school, in a room specifically reserved for the study; here, data collection took place from mid-July to mid-August 2014. A structured questionnaire was developed to assess children's handwashing practices, the RANAS behavioural determinants, and sociodemographic characteristics (see Appendix III for a French version of the questionnaire). The items were worded to suit the age of children attending first through sixth grade and were translated from English into the local languages Kirundi (Burundi) and Shona (Zimbabwe). During interviewer training, the translated

questionnaires were closely reviewed by project staff and interviewers to ensure the meaning of the questions was accurate. All measures were pretested in non-study areas among a group of 30 children with regard to feasibility, language appropriateness, duration, content validity, and question comprehensibility. The surveys were implemented using the mobile data collection software Open Data Kit Collect (Hartung et al., 2010) on a tablet device and lasted about 15-20 minutes. In Zimbabwe, response cards were used to increase the children's motivation to participate in the interview and to facilitate their answer choice (Narayan, Heward, Gardner, Courson, & Omness, 1990; Randolph, 2007). In Burundi, the response cards were pre-tested but were found to distract the children. Final interview data were available from 669 children enrolled in 20 primary schools in Burundi and from 524 children enrolled in 20 primary schools in Zimbabwe attending first through sixth grade. Information on the study groups is presented in Table 9.

Table 9. Description of the Study Groups

	Burundi	Zimbabwe
Children characteristics	*n* = 669	*n* = 524
Age of pupils	10.7 (2.5)	9.5 (1.6)
Proportion of girls	357 (53.4)	262 (50.0)
School characteristics	*n* = 20	*n* = 20
Pupils per teacher	50.0 (10.8)	37.6 (5.1)
Pupils per latrine/toilet	94.9 (59.1)	45.0 (13.4)
Posters or other promotional material for handwashing	5 (25)	11 (55)
School committee in charge of hygiene issues	10 (50)	7 (35)
Involvement of parents in school hygiene	10 (50)	8 (40)
Pupils per handwashing facility	264 (260)	87 (44)
Water available for handwashing on day of field visit	15 (75)	18 (90)
Soap available for handwashing on day of field visit	9 (45)	5 (25)

Note. Data are means (*SD*) or numbers (%).

Measures

Self-reported handwashing frequency after using the toilet at school was measured with a single item ('Do you wash your hands with soap and water after you use the toilet at school?') on a four-point rating scale (from 0 = not at all to 1 = a great deal). The spot-check observational method (Ruel & Arimond, 2002) was used to assess the availability of soap and water and the number, type, and condition of handwashing stations. The operationalization of the behavioural constructs was based on the RANAS model and derived from previous research on handwashing practices and water consumption in developing countries (Contzen

& Mosler, 2013, 2015; Huber & Mosler, 2013; Inauen, Tobias, et al., 2013). Responses were scored on a 0 to 1 scale, representing the minimum and maximum possible values. For example, 'Are you afraid of getting diarrhoea?' (0 = not at all afraid to 1 = extremely afraid). All variables were coded so that high values were favourable to the behaviour. A single question was used to quantify each factor (see Table 10 for the items). Factual knowledge was assessed through several closed-ended questions, to which each correct answer was assigned one point. To standardize the ranges, the scores were transformed into the value range of the other variables (0 = no knowledge to 1 = maximum knowledge).

Ethics Statement

The ethical review committee of the Faculty of Arts, University of Zurich provided ethical approval for this project. In Burundi, the survey protocol was approved by the National Ethics Committee of Burundi (Comité National d'Éthique pour la protection des êtres humains participants à la recherche biomédicale et comportementale). Permission to conduct this survey was obtained from the Provincial Health Office and from the Provincial Education Office. In Zimbabwe, the study received ethical approval from the Research Council of Zimbabwe. The survey was conducted with the approval of the Ministry of Health and Child Care and the Ministry of Primary and Secondary Education. Prior to data collection, permission was obtained from all principals of participating schools and informed consent was obtained from all caregivers prior to seeking consent from their children.

Data Analysis

Statistical analysis was performed using SPSS version 21 (SPSS, Chicago, IL, USA). Although the data were derived from a clustered design, no multilevel analyses were executed because only a very low percentage of variance (less than 2% for both data sets) was determined by the school clusters. Forced-entry linear multiple regression analyses were performed for each country separately. Cases with missing values were excluded.

Table 10. Questions to Assess Behavioural Determinants

Behavioural determinants	Items
Risk factors	
Perceived vulnerability	Are you afraid of getting diarrhoea?
Perceived severity	Is it bad for you if you get diarrhoea?
Health knowledge	What are the effects of diarrhoea on your body?
	Can you tell me why people get diarrhoea?
	How can you protect yourself against diarrhoea?
	Why is it important to wash your hands?
Attitude factors	
Instrumental beliefs: Time	Does washing hands with soap and water take a lot of time?
Affective beliefs: Liking	Do you like to wash your hands with soap and water?
Affective beliefs: Disgust	Do you feel dirty if you don't wash your hands after you use the toilet?
Norm factors	
Descriptive norm	Do other children at school wash hands with soap and water after they use the toilet?
Injunctive norm	Do your teachers think you have to wash your hands with soap and water after you use the toilet?
Ability factors	
Action self-efficacy	Are you sure, that you can always wash your hands with soap and water after you use the toilet at school?
Self-regulation factors	
Action control	Do you pay attention to always washing your hands with soap and water after you use toilet?
Remembering	Do you always remember to wash your hands with soap and water after you use toilet?
Commitment	Is it important to you to wash your hands with soap and water before you use the toilet?

Note. Scales range from 0 = not at all to 1 = a great deal.

Results

In Burundi, children reported sometimes washing hands at school after using the toilet (M = 0.56, SD = 0.27) (see Table 11). The survey did not find high knowledge about diarrhoea and disease transmission (health knowledge). Accordingly, the children perceived a low risk of contracting diarrhoea (perceived vulnerability) and did not think it is was bad if they did (perceived severity). Children reported that washing hands takes a lot of time (instrumental belief). They indicated liking washing hands (affective belief: liking) and feeling rather dirty if they do not (affective belief: disgust). The overall social influence experienced by the children scored 0.57 (descriptive norm) and was much higher, at 0.74, for their perception of the teachers' approval of the behaviour (injunctive norm). Children expressed medium levels of confidence in their ability to always wash hands (self-efficacy), to always pay attention to

executing the behaviour (action control), and to never forget to wash hands (remembering). Finally, children reported always washing hands with soap at school after using the toilet as very important (commitment). In Zimbabwe, children reported washing hands rather frequently at school (M = 0.58, SD = 0.39). Again, the survey did not find high knowledge about diarrhoea and disease transmission. Despite this, perceived vulnerability regarding diarrhoea and perceived severity of the consequences of contracting the disease were rated higher. When comparing the mean scores of the behavioural determinants from Burundi with those from Zimbabwe, primary school children from Zimbabwe reported liking washing hands even more, they expressed higher levels of self-efficacy, action control, and remembering, and their commitment to always washing hands with soap at school after using the toilet was even higher.

Table 11. Descriptive Statistics and Linear Regression Analyses Summaries of the RANAS Behavioural Determinants Predicting Self-Reported Handwashing Behaviour and Their Intervention Potential

	M (*SD*)	*b*	*SE b*	*B*	*p*	95% CI for *b*	Intervention Potential
Burundi							
Perceived vulnerability	0.31 (0.30)	-0.06	0.03	-.06	.042	-0.11, 0.00	0.041
Perceived severity	0.47 (0.32)	0.08	0.03	.09	.007	0.02, 0.13	0.042
Health knowledge	0.38 (0.25)	0.05	0.03	.04	.159	-0.02, 0.12	0.031
Instrumental belief	0.75 (0.21)	0.00	0.04	.00	.927	-0.07, 0.08	0.000
Affective belief: Liking	0.65 (0.20)	0.08	0.05	.06	.109	-0.02, 0.18	0.028
Affective belief: Disgust	0.60 (0.25)	0.06	0.04	.06	.091	-0.01, 0.13	0.024
Descriptive norm	0.57 (0.31)	0.41	0.03	.47	.000	0.35, 0.46	0.176
Injunctive norm	0.74 (0.25)	0.03	0.04	.03	.420	-0.04, 0.10	0.008
Action self-efficacy	0.66 (0.21)	0.24	0.04	.19	.000	0.16, 0.32	0.082
Action control	0.58 (0.23)	0.08	0.05	.07	.105	-0.02, 0.19	0.034
Remembering	0.57 (0.23)	-0.02	0.05	-.02	.646	-0.12, 0.08	0.009
Commitment	0.72 (0.20)	0.01	0.04	.01	.771	-0.07, 0.10	0.003
Zimbabwe							
Perceived vulnerability	0.60 (0.42)	0.06	0.04	.07	.121	-0.02, 0.14	0.024
Perceived severity	0.65 (0.41)	-0.04	0.04	-.04	.321	-0.12, 0.04	0.014
Health knowledge	0.34 (0.17)	0.14	0.10	.06	.158	-0.05, 0.33	0.090
Instrumental belief	0.69 (0.39)	-0.10	0.04	-.10	.008	-0.18, -0.03	0.032
Affective belief: Liking	0.90 (0.22)	-0.08	0.08	-.04	.319	-0.23, 0.07	0.008
Affective belief: Disgust	0.64 (0.41)	-0.01	0.04	-.01	.813	-0.09, 0.07	0.003
Descriptive norm	0.51 (0.41)	0.15	0.04	.15	.000	0.07, 0.22	0.071
Injunctive norm	0.81 (0.32)	-0.01	0.05	-.01	.862	-0.12, 0.10	0.002
Action self-efficacy	0.77 (0.35)	0.31	0.05	.28	.000	0.21, 0.40	0.071
Action control	0.78 (0.33)	0.16	0.05	.14	.003	0.06, 0.26	0.035
Remembering	0.78 (0.31)	0.17	0.06	.13	.003	0.06, 0.28	0.036
Commitment	0.85 (0.28)	-0.02	0.06	-.02	.718	-0.14, 0.10	0.003

Note. Burundi: n = 669; adjusted R^2 = .45. Zimbabwe: n = 524; adjusted R^2 = .24. *SD* = standard deviation; CI = confidence interval. All variables ranged from 0 to 1.

Behavioural determinants of handwashing practices

A multiple regression analysis was conducted to investigate key behavioural determinants of self-reported handwashing frequencies after using the toilet at school using the data from each country (see Table 11). An analysis of the variance inflation factors (VIFs) in the regression models indicated acceptable multi-collinearity. All VIFs were below 2, except for action control (VIF = 2.37) and remembering (VIF = 2.36) in Burundi. In Burundi, the twelve behavioural determinants accounted for a significant proportion of self-reported handwashing frequencies, adjusted R^2 = .45, $F(12, 656) = 46.17$, $p < .001$. The results revealed that children were more likely to report high handwashing frequencies if they were not afraid of getting diarrhoea (perceived vulnerability), if they thought it was bad when they caught diarrhoea (perceived severity), if they perceived that many other children at school washed hands (descriptive norm), and if they felt confident in always being able to wash hands with soap after using the toilet at school (action self-efficacy). In Zimbabwe as well, the behavioural determinants accounted for a significant proportion of self-reported handwashing frequencies, adjusted R^2 = .24, $F(12, 511) = 14.84$, $p < .001$. For Zimbabwe, the results showed that children were more likely to report high handwashing frequencies if they said that handwashing with soap takes a lot of time (instrumental belief), if they perceived that many other children at school washed hands (descriptive norm), if they were sure that they can always wash hands with soap and water after using the toilet (action self-efficacy), if they indicated paying a lot of attention to always washing hands with soap (action control), and if they claimed to always remember to perform the behaviour (remembering).

Intervention potential of the behavioural determinants

As described in the RANAS approach, the values of the intervention potentials represent the absolute value of the difference between 1, the highest possible scale value, and the sample mean, multiplied by the unstandardized regression weight of the determinant (see Table 11). Higher values indicate a greater potential impact if that determinant is targeted by an intervention. For Burundi, the three highest intervention potentials were reached for the descriptive norm (IP = 0.176), action self-efficacy (IP = 0.082), and perceived severity (IP = 0.042). For Zimbabwe, the results indicated that health knowledge (IP = 0.090), the descriptive norm (IP = 0.071), and action self-efficacy (IP = 0.071) should be targeted by an intervention.

Selection of the behaviour change techniques

The RANAS behaviour change techniques that seemed most promising were selected for the three behavioural determinants with the highest intervention potentials in each country, (see Figure 4). In addition to these quantitative results, qualitative observational findings on school handwashing characteristics revealed that in many schools soap, and in some even water, were not available for handwashing on the day of the field visit (see Table 9). Furthermore, in Burundi, there were on average over 250 students per handwashing facility. This pupil-to-handwashing-facility ratio exceeds the international guidelines, which recommend one handwashing facility per 50-100 students (UNESCO, 2004). These quantitative and qualitative results served as a basis for developing a programme based on informational, infrastructural, and normative interventions with the overall goal of supporting and guiding all participants towards established handwashing habits. The behaviour change techniques selected are meant to (1) create personal awareness for washing hands with soap and water, (2) raise the actual ability to wash hands at school and thus to raise the children's confidence in their own ability to perform the behaviour, and (3) highlight others' handwashing behaviour at school.

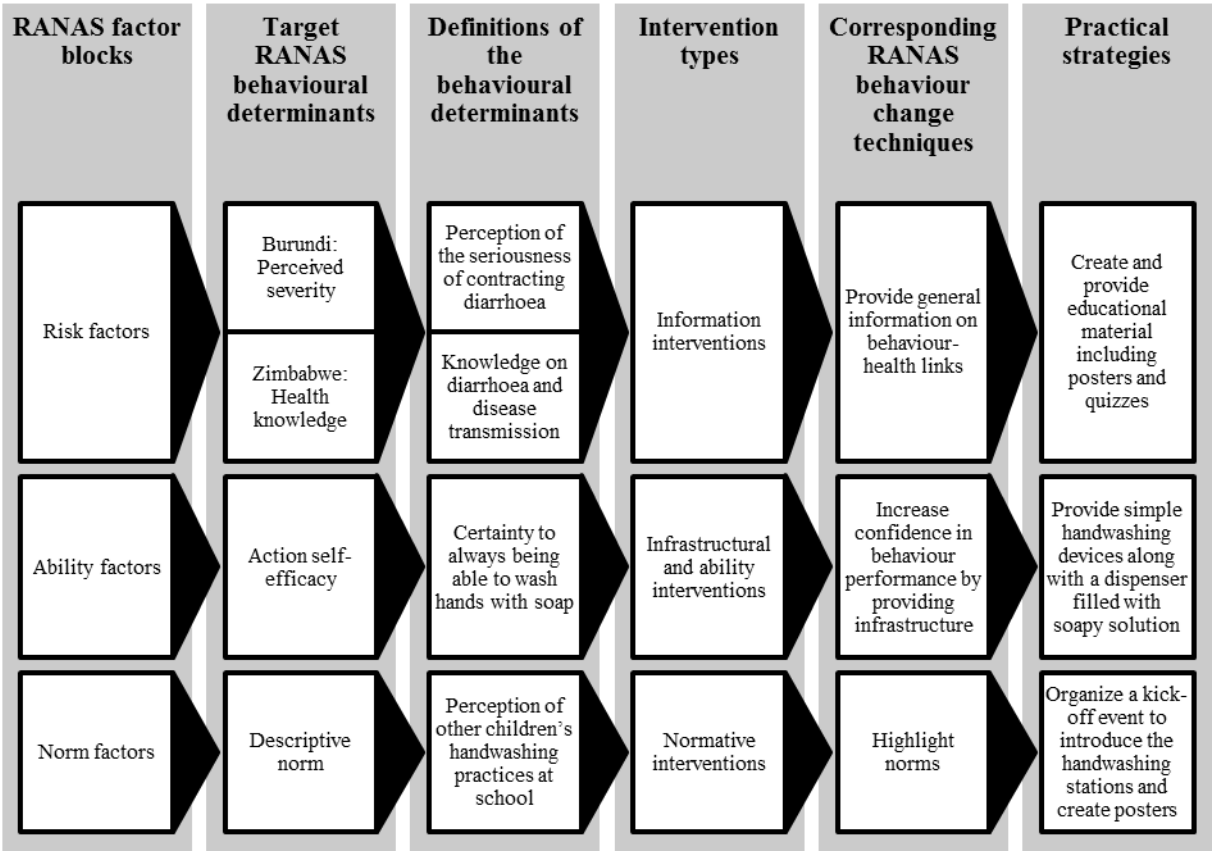

Figure 4. Derivation of the practical strategies from the RANAS behavioural determinants through the corresponding behaviour change techniques.

Translation into practical strategies

Figure 4 illustrates the translation of the behaviour change techniques into practical strategies. (1) Information interventions to enhance knowledge acquisition and raise the perceived seriousness of contracting diarrhoea consist of messages about the causes of diarrhoea and the consequences of the disease, creating the precondition for change (Albarracín et al., 2005; Bandura, 2004; Fisher & Fisher, 1992; Stanton, Black, Engle, & Pelto, 1992). Teachers are trained to sensitize the children on the issue of diarrhoea, using posters depicting transmission routes of diarrhoea pathogens, a description of the handwashing steps, and recommendations for situations in which washing hands is critical, along with risk factors, signs, and symptoms of diarrhoea. (2) Infrastructural interventions are proposed to enhance the children's self-efficacy and thus their confidence in their ability to perform the behaviour (Bandura, 1982; Rosenstock, 1974). Each classroom should be equipped with a simple handwashing device along with a dispenser filled with soapy solution. As a short-term solution, soap should be provided for the duration of the project. A strategy already pursued in the province of Ngozi, Burundi is that children bring water if the school does not have a water source. As a long-term

solution, income-generating activities should be discussed with the schools, policy dialogues at provincial and ministerial level should aim at the allocation of funds for soap, and advocacy is needed to assure the availability of water in schools. (3) An intervention highlighting the commonness of handwashing at every school is suggested to tackle social norms (Abraham, 2012; Mosler, 2012). A kick-off event to introduce the new handwashing stations should be organized. The inauguration could be accompanied by a handwashing song, and each class should create handwashing posters serving as a public commitment to being a handwashing class.

Discussion

In this article we describe an application of the RANAS systematic approach to behaviour change for the development of a school handwashing programme for primary school children in a rural and an urban setting in two sub-Saharan African countries. The results of the regression analyses revealed that the RANAS behavioural determinants predicted children's self-reported handwashing frequencies very well in both countries. In Burundi, high reported handwashing frequencies after using the toilet were best predicted by a high perceived severity of diarrhoea, the perception that many other children wash hands at school too, and a strong confidence in one's abilities to always perform the behaviour. In Zimbabwe, the behavioural determinants with the highest predictive value proved also to include the perception that other children wash hands at school too, the confidence in one's abilities to always perform the behaviour, and, moreover, paying a lot of attention to always washing hands after using the toilet at school. The findings in this study are consistent with the results of studies conducted with primary caregivers of young children in Haiti and southern Ethiopia showing that the relevant significant behavioural determinants from the present regression analyses were also predictive of self-reported handwashing (Contzen & Mosler, 2015). In Bogotá, Colombia, school children also reported higher subjective norms and higher perceived control (akin to self-efficacy) when their intention to wash hands properly was high (Lopez-Quintero et al., 2009). School children in Selat sub-district, Indonesia were also more likely to wash hands properly when their perceived behavioural control was high (Setyautami et al., 2012). The results from Burundi and Zimbabwe indicate an overall lack of awareness of hygiene issues in both countries. Low norms for handwashing and the children's low perceived ability are consistent with the lack of adequate infrastructure at the schools.

The improvement potentials calculated suggest that an intervention targeting social norms and self-efficacy should be most effective in both countries. Additionally, in Burundi, children that do not perceive diarrhoea as severe should be targeted by the intervention. In Zimbabwe, children with less knowledge of diarrhoea and disease transmission should profit from the proposed programme. Based on these results and taking into consideration the observational findings on the school handwashing characteristics, a school handwashing programme was developed that fit the target groups. The interventions of the programme aim to (1) create awareness of the benefits of handwashing through educational activities, (2) raise children's ability and confidence to wash hands at school through infrastructural improvements, and (3) highlight the commonness of handwashing at school through events and poster creation. Several studies have been able to show that raising awareness for the importance of handwashing and increasing hygiene knowledge leads to an improvement in proper handwashing (O'Reilly et al., 2008; Patel et al., 2012; Saboori et al., 2013). Moreover, the presence of handwashing stands at school has been found to be associated with proper handwashing (Monney et al., 2014; Setyautami et al., 2012; Steiner-Asiedu et al., 2011), and providing soapy water has been shown to raise the frequency of handwashing practices at school (Saboori et al., 2013). By introducing the new hardware with a big event and because of the continuous use of the handwashing stations by all children, the behaviour should become common practice, increasing the descriptive norm at each school (Curtis et al., 2009; Scott, Lawson, et al., 2007) and enhancing the children's self-efficacy through facilitation of the behaviour (Biran, 2011; Curtis et al., 2009; Zhang et al., 2013).

Limitations

The results should be viewed with the caution necessary with self-reported behaviours. Several studies have shown that self-report overestimates handwashing behaviour when compared to observed frequencies (Curtis et al., 1993; Manun'Ebo et al., 1997). However, collecting observed data on all children included in this study would have been very difficult and costly and extremely time-consuming. In addition, the operationalization of the behavioural determinants can be criticized because they were measured with only one item. Even though we do not have reliability indicators for the survey items, keeping the questionnaire short was necessary to keep the children motivated to participating in the survey. The present study is cross-sectional, so that relationships between variables are descriptive and do not imply causality. However, the results of the regression analyses have

been confirmed by previous work focusing on caregivers' handwashing practices (Contzen & Mosler, 2015).

Conclusions

The RANAS systematic approach to behaviour change allowed us to determine the relative importance of the behavioural determinants underlying school children's handwashing practices and thus to select appropriate behaviour change techniques. Several reviews of health promotion programs have concluded that the quality of an intervention is increased by the use of methods derived from social-cognitive theories (Al-Tawfiq & Pittet, 2013; Schaafsma, Kok, Stoffelen, & Curfs, 2015; van Empelen et al., 2003). The findings of this study strongly suggest that similar handwashing programs providing education on handwashing issues along with adequate infrastructure could induce behavioural change in rural and urban settings in two different countries.

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Chapter V

General discussion

1. Summary of the findings

As yet, rates for handwashing with soap at critical junctures remain remarkably poor in developing countries (Freeman et al., 2014) and although promising approaches to changing handwashing practices are emerging (Biran et al., 2014; Contzen et al., 2015), it is first and foremost important to explain and predict what initiates the behaviour in order to effectively promote safe handwashing with soap. Most strategies to change health behaviours have focused on individual-level factors and have been derived from social-cognitive models of behaviour change (e.g. theory of planned behaviour, Ajzen, 1991; social cognitive theory, Bandura, 2004). However, health behaviours are shaped through a complex interplay of determinants at different levels, including the physical and social environment (Stokols, 1992b). This thesis aimed at contributing to the research on predicting handwashing practices in infrastructure-restricted settings by proposing a comprehensive framework to explain health behaviour. Drawing on ecological perspectives and a range of previously developed models of health behaviour, the framework of this thesis incorporates the physical and social environments and conceptualizes health as determined by a dynamic interplay of physical environment, multiple social dimensions, and personal attributes influencing intention and behaviour through social-cognitive factors.

Three studies were conducted. The first study (Chapter II) used an on-site visitor survey to examine whether and how a handwashing promotion event influenced participants' cognitions and thus their intentions to practise safe handwashing in rural India. The second study (Chapter III) specifically investigated how factors of the physical environment along with economic conditions influenced handwashing frequency among caregivers of primary school children in rural Burundi and explored the contributing role of social-cognitive variables. Finally, in Chapter IV, the social-cognitive determinants underlying handwashing practices were assessed among children attending primary school in rural Burundi and urban Zimbabwe, and the school environments and conditions related to handwashing practices were appraised to develop appropriate and customized school handwashing programmes.

The following discussion is guided by the research aims outlined in the introductory Chapter I. The detailed results of the empirical studies were discussed in the respective chapters. In the following sections, the accumulated findings of the empirical chapters will be summarized, discussed, and embedded within the proposed health behaviour framework. Based on these findings, implications for further research and practice are suggested. Methodological,

theoretical, and practical aspects are discussed to stimulate and facilitate both future research and the practical application of health behaviour frameworks. The main findings of this thesis are summarised in Table 12.

2. The effect of a one-time socio-cultural event in changing social-cognitive determinants and intention of handwashing

The results of the first study reported in this thesis (Chapter II) revealed how *The Great Wash Yatra* (TGWY) handwashing promotion event affected the visitors' intention to wash hands and the underlying behaviour determinants. The goal of the developers of TGWY was to create a unique Indian environment that would appeal to a predominantly rural audience and be immersive and genuinely fun. WASH United and Quicksand wanted TGWY to become a platform to embed messages on water, sanitation, and hygiene using new and innovative elements such as games and performances. TGWY traveling campaign sought to engage visitors in the issues of handwashing in a playful and carnival-style atmosphere on a 10,000 square metre area. The campaign's interactive educational games, thematic laboratories, and stage shows were inspired by cricket, Bollywood song and dance, parlour games, and popular TV formats, all subjects that Indians are often passionate and excited about. The game zone comprised nearly 20 games that were housed in custom-designed stalls, arcade-like settings, or outdoors. Most activities were based on traditional Indian board, outdoor, or knowledge games (Jurga, 2013).

TGWY campaign seemed to have effectively increased the visitors' knowledge of the causes of diarrhoea and on the benefits of washing hands and to have raised their confidence that washing hands protects them and their family from diarrhoea. Indeed, the importance of washing hands was reinforced at each activity and messages were disseminated on-site through a movie, posters, flyers, and on-stage activities. Several studies have shown that raising awareness of the importance of washing hands leads to an improvement in proper handwashing (O'Reilly et al., 2008; Patel et al., 2012; Saboori et al., 2013). However, other studies have also suggested that health education alone may be ineffective in changing behaviour (Biran et al., 2009; Huda et al., 2012; Loevinsohn, 1990).

Table 12. Overview of the main findings of the thesis

Chapter	Aim	Findings	Conclusions
II	Assess the effect of a handwashing promotion event using the RANAS social-cognitive determinants underlying the intention to wash hands	Visiting the handwashing promotion event had little effect on the intention to wash hands with soap and close to a medium effect on the visitors' knowledge about the benefits of washing hands and their belief that washing hands protects them and their children from diarrhoea. Respondents who had actively participated in campaign activities did not show a greater increase in their intention to wash hands than respondents who had not. Commitment to always washing hands after using the toilet proved to be the strongest predictor for intention.	Visiting this handwashing promotion event seemed to have raised awareness of the importance of washing hands after using the toilet both among visitors who had actively participated in campaign events and those who had not. However, the marginal increases in the visitors' intentions to always perform the behaviour prove that substantively changing behaviour requires more than improving knowledge and emphasizing the importance of washing hands. Identifying and specifically targeting the crucial behavioural determinants for handwashing are an important first step in planning effective programmes.
III	Investigate the role of contextual factors in addition to the social-cognitive determinants along with their interactions in predicting handwashing practices	Of the contextual factors examined, household wealth, the amount of water per person, and having a designated location to wash hands were significantly associated with handwashing frequency, whereas the time taken to collect water and the amount of money spent on soap per person per month were not. Adding the RANAS psychosocial factors to the model substantially improved the prediction. At the same time, household wealth and having a designated location to wash hands lost their effects on handwashing frequency. The most important predictor was a high feeling of self-efficacy.	The full and partial mediation effects of contextual factors through psychosocial factors are examples of the potential impact of interactions between environmental influences and social-cognitive determinants on handwashing behaviour. The results are consistent with health promotion approaches that stress the importance of a physical environment enabling and facilitating the desired behaviour. The findings emphasize the need to consider the role of social-cognitive factors on creating and maintaining health-promoting environments when developing behaviour change interventions.
IV	Develop school handwashing programmes by identifying the relevant social-cognitive determinants of children's handwashing practices and considering observational findings of the school handwashing environment	In both rural Burundi and urban Zimbabwe, a programme targeting social norms and the children's confidence in always being able to wash hands at school after using the toilet would be most effective. Additionally, in Burundi, raising the children's perception of the severity of contracting diarrhoea and in Zimbabwe, increasing children's knowledge of diarrhoea and disease transmission should be included in the programme. Qualitative observational findings on school handwashing characteristics revealed that in many schools soap, and in some even water, were not available for handwashing. In Burundi, the pupil-to-handwashing-facility ratio far exceeded that recommended by international guidelines.	The findings from the survey based on the RANAS social-cognitive determinants along with observational findings on school handwashing characteristics allowed the development of customized and appropriate behaviour change programmes for two different sub-Saharan countries in rural and urban settings. The RANAS systematic approach to behaviour change resulted in programme proposals including information interventions to create awareness of the benefits of handwashing and infrastructural interventions to raise the children's ability and confidence in washing hands at school. The proposals also include highlighting the commonness of handwashing at the schools through events and poster creation.

Part of the approach of TGWY was to create an environment which associated the issue of sanitation and hygiene with positive emotions. When looking at the differences in the RANAS social-cognitive factors, there was indeed an increase, with a small to medium effect size in the affective beliefs liking to wash hands with soap and feeling dirty if hands are not properly washed after using the toilet. As Curtis et al. (2009) concluded after reviewing the results of formative research studies, disgust seems to be a potent motivator for washing hands with soap. Whitby, McLaws, and Ross (2006) reported related findings; nurses stated that they washed hands when physically dirty or feeling sticky but also when they feel "emotionally" dirty. The injunctive norm increased to a similar extent, which makes sense considering that the Indian Minister of Drinking Water and Sanitation attended the press conference at the first three stops and that the Ministers of Rural Development from the different states attended TGWY. Moreover, Irfan Pathan, one of the most talented all-rounders in contemporary cricket, and Vidya Balan, one of the most popular Bollywood actresses, were brand ambassadors of the campaign. Injunctive normative beliefs are concerned with the likelihood that important referent individuals or groups approve or disapprove of a given behaviour, as stated in the theory of planned behaviour (Ajzen, 1991). Providing information about others' approval has been mentioned as a technique for changing health behaviour by several different authors (Abraham & Michie, 2008; Michie, Atkins, & West, 2014; Mosler, 2012). Finally, visitors reported higher confidence in their abilities to always wash hands with soap after their visit than they did before their visit. At TGWY event, handwashing was promoted including the steps necessary to properly wash hands with soap, and it was demonstrated how simple handwashing stations could easily be built. As Mosler (2012) suggested in his systematic approach to behaviour change, infrastructural and ability interventions can help individuals gain confidence in their ability to perform a behaviour. A visit to TGWY made respondents aware of their own competence and enhanced their confidence in performing the behaviour through instructions and skills demonstrations (Bandura, 2004), techniques that were suggested by Michie et al. (2013).

When trying to explain the slight increase in the visitors' intention to wash hands from before to after their visit to TGWY with changes in social-cognitive factors, an increase in the respondents' commitment to always washing hands after using the toilet emerged as the best predictor. Although the overall increase in commitment from before to after the visit was marginal, an increase in intention largely depended on whether the event was successful or not in raising the visitors' perceived importance of washing hands with soap after using the toilet. As defined by Tobias (2009), commitment is the strength of internal pressure felt to

perform a behaviour and can represent the importance to the individual of performing this behaviour. Commitment has been described as reflecting a motivational aspect of intention formation (Bagozzi, 1992), and an increased intensity of intention has been linked to heightened commitment to the intended action (Gollwitzer, 1993). Considering this proximity of the concept of commitment to intention, it is possible that commitment mediated the effect of other social-cognitive factors that showed more prominent increases, for example action self-efficacy, which has been said to influence the strength of commitment (Bandura, 2004).

Interestingly, no meaningful differences were found between visitors who had played actively and those who had not. However, these results confirm the overall trend of the findings that attending TGWY was effective in itself and that it did not make a difference whether visitors additionally played games and participated in activities or not. Due to the limited number of respondents who had participated in a particular game, it was not possible to study the effect for each individual activity. Indeed, the number of visitors was far higher than expected and resulted in long queues in front of the stalls. Since only visitors that were over 16 years old were interviewed, and since most adults let children go first, the findings depict the overall effect of attending this event rather than the additional effect of dynamic involvement in activities. As stated in the theory of triadic influence (Flay et al., 2009) and as suggested by the theoretical health behaviour framework of this thesis, attending TGWY can be viewed as accessing several new environments that influence the intention to wash hands through social-cognitive determinants. The influence of the social relations environment particularly targeted social norms by using politicians, cricket players, and a Bollywood actress to raise the issue of washing hands with soap. A rich information environment successfully enhanced knowledge of handwashing issues. The promotion of simple handwashing stations raised awareness of how the built environment can facilitate habitual handwashing. Finally, a cultural environment filled with music, colour, dance, and excitement was fruitful in raising positive feelings about handwashing and feelings of disgust about leaving hands unwashed.

The marginal increase in the visitors' intention to wash hands in Chapter II offers limited promise that this large-scale campaign might have a large impact in reducing childhood diarrhoea. First of all, the intervention was not tailored to the specific population as suggested in Mosler's approach (2012), meaning that interventions are matched to the key factors determining behaviour within a specific population with a high improvement potential. Moreover, several other studies have found that more personalized campaigns are more effective in changing behaviour. For example, Madajewicz et al. (2007) found that a house-to-

house information campaign was more effective in encouraging people to collect water from a safe well than a media information campaign. Galiani et al. (2012) found that a mass media intervention in Peru was not effective in increasing observed handwashing with soap at critical junctures or in improving the knowledge of mothers and caregivers regarding appropriate handwashing, while promotional events at the community level and one-to-one activities seemed successful. And finally, Ejemot-Nwadiaro et al. (2008) reviewed 14 randomized trials and found that handwashing programmes can be effective, but that they require intense follow-up and monitoring. A study concurrent with TGWY was conducted to assess the impact of the event at household level. The results are available in a working paper version (Seimetz & Mosler, 2013). One of the recommendations resulting from this survey, implemented at household level and targeting primary caregivers of children under the age of five, was that future campaigns aiming at long-term behaviour change should ensure that women and caregivers play an active role in the project, since in most cases they prepare the household food and are responsible for taking care of children and their sanitation needs. Moreover, the extremely limited impact of a visit to TGWY at household level again emphasizes the importance of planning enough time between baseline data collection and campaign design so as to meaningfully incorporate important findings into the development of interventions. Based on the lessons learned from this survey, the following project phase in Africa began with a comprehensive baseline survey on people's handwashing practices at school and household levels while taking into account the environment and implicating policy decision makers in the development of customized interventions.

3. The role of the built environment and economic conditions in predicting handwashing frequency

The focus of the second study of this thesis (Chapter III) was on the physical environment, including households' economic constraints and how they affect caregivers' handwashing practices in rural Burundi in combination with social-cognitive factors. The assessment of the social-cognitive variables was based on the RANAS approach, and the selection of the contextual factors was based on observations from previous studies. As discussed in the introduction of this thesis, and as outlined in the health behaviour framework, a distinction was made between the natural and the built physical environment (Gifford et al., 2011). The distance to the water source was considered to be part of the natural environment, whereas the quantity of water and soap available per person per day and the presence of a designated

location for handwashing were considered to be part of the built environment and as such amenable to change by the household members themselves. A household's economic situation was added as a factor of the social environment that has been found to influence handwashing practices, as have the individual characteristics of age, education, and marital status of the caregivers.

The findings from the first step of the analysis revealed that the caregivers' reported handwashing frequency seemed to be unaffected by the socio-demographic individual characteristics assessed. Findings concerning the association of education and age with handwashing practices are mixed, with some studies reporting associations (e.g., Diouf et al., 2014; Tao et al., 2013), while others do not (e.g., Al-Mazrou et al., 1991; Seksaria & Sheth, 2014). Intervention programmes might be more efficient when targeting particular populations that seem to be more at risk than others. Older caregivers might be more health-conscious, for example, because they have more children and have visited the local health centre more often, and therefore are more likely to properly wash hands. Alternatively, mothers that have achieved a higher level of education might be more influenced by national campaigns promoting general hygiene or might be more likely to seek health care and accept health care recommendations and thus might use soap more when washing hands at critical junctures. Higher maternal education is often associated with maternal employment and higher household income (e.g., Grootaert, Kanbur, & Oh, 1995). Households in which the mother has a higher level of education may thus be more financially able to afford soap for handwashing. However, in this study, hardly any women had attended secondary education, resulting in dividing education into two categories by distinguishing between caregivers who had completed primary school and those who had not. Considering the limited employment opportunities in rural Burundi, with an economy based mainly on agriculture and stock-breeding and similar standards of living across rural households, finding a difference in handwashing practices based on the mother's level of education would have been very unlikely.

In the analysis of the study, household wealth as part of the social environment was considered a fixed contextual factor and thus not easily subject to change through interventions. A high score on the household wealth index created during the study was a significant predictor for handwashing frequency; this relationship has been confirmed in other studies (e.g., Gorter et al., 1998; Luby & Halder, 2008). When the social-cognitive factors were included in the model, household wealth was no longer associated with reported

handwashing frequency. When looking at the bivariate correlations, household wealth was most strongly associated with self-efficacy, followed by action control and commitment, determinants belonging to the ability and self-regulation factor blocks of the RANAS model (Mosler, 2012). As postulated by the theory of planned behaviour (Ajzen, 1991), behavioural achievement is strongly influenced by people's confidence in their ability to perform the behaviour, and self-regulatory strategies play an important role in translating goals into action (Luszczynska & Schwarzer, 2003; Schwarzer, 2008). Thus, low economic status may inhibit the active adoption and maintenance of safe handwashing behaviour by affecting ability and self-regulatory factors. Even though in this sample the relationship between the amount of money spent on soap and handwashing seemed to be unaffected by household wealth, more complex mediational relationships may be involved, just as, for example, they have been found for smoking cessation; smoking status is influenced by socio-economic status through neighbourhood disadvantage and social support that both affect perceived confidence in control of negative affect and cravings (Businelle et al., 2010).

Interestingly, the time needed to collect water proved not to be a predictor for handwashing frequency, and the variable correlated only weakly with ability and self-regulation factors. Although it might be intuitive to think that this natural environment factor is a potential impediment that strongly influences regular handwashing practices, data suggest that, once the water source is outside the compound, the association between handwashing and distance from water source disappears (Omotade et al., 1995; Scott, Curtis, et al., 2007). The quantity of water available per person per day was the only contextual factor that remained a significant predictor when the social-cognitive variables were entered into the model. Since the amount of water per person available at household level was considered to be part of the built environment and thus to be part of the self-created context, it would have been reasonable to assume that the influence of this factor was diminished by the social-cognitive variables, especially since there were small to medium correlations between the amount of water per person and the social-cognitive factors of self-efficacy, remembering, action control, and cost beliefs. However, the results showed that the quantity of water influenced reported handwashing frequency even when controlling for social-cognitive determinants. One explanation might be that caregivers collecting more than the required bare minimum of water for consumption have developed habitual handwashing practices. Habitual behaviour may originate in intentionally performed actions, but a habit response is finally triggered directly by contextual cues, such as the presence of water (Orbell & Verplanken, 2010). Indeed, habit has been found to act as a moderating variable on the relationship between

intentions and behaviour (Limayem, Hirt, & Cheung, 2007). As stated in the theory of planned behaviour (Ajzen, 1991) intentions are assumed to capture the motivational factors that influence behaviour, so it might be that the salience of social-cognitive determinants in predicting handwashing frequency decreases among caregivers that have developed a habit of washing hands with soap at critical junctures and thus regularly collect more water. Finally, the direction of causality between this self-created contextual factor and social-cognitive determinants remains unclear. It is possible that both have a natural reciprocal relation in the sense that self-efficacy to collect sufficient water for handwashing results in more water available per person, which in turn causes an enhancement in self-efficacy. Because the data are cross-sectional, the issue of causality remains untested, and it is possible that variables may act simultaneously as both cause and effect (Weinstein, 2007).

Another self-created contextual factor that was considered is the amount of money spent on soap per person per month. The most likely explanation for the findings presented in Chapter III is that the amount of money spent on soap indeed does not reflect soap use for washing hands at critical junctures, since soap is most often used for washing clothes and since it is used on occasions, such as in the morning after getting up, after dirty work, or before going to church, which are not critical junctures important to preventing diarrhoea (Biran et al., 2005). On the other hand, the presence of a designated location for handwashing was a strong predictor for handwashing frequency. As with household wealth, once the social-cognitive factors were included in the model, the presence of a designated location for washing hands was no longer associated with reported handwashing frequency. As part of the built environment, a designated location to wash hands and handwashing infrastructure can serve as a reminder and might thus have be explained through self-regulation factors (Contzen et al., 2015). The strongest bivariate correlation of having a designated handwashing location with social-cognitive determinants was action planning. Indeed, the concept of action planning refers to specifying when, where, and how to wash hands (Sniehotta et al., 2005). Again, these results need further investigation and confirmation.

The findings of the study presented in Chapter III serve to highlight the potential added value of contextual factors in understanding cognitions and behaviour, but further work is required to understand the ways by which multiple environmental factors and individual characteristics influence cognition and behaviour. Bivariate correlations showed that self-regulation and ability factors were mostly associated with factors from the built environment. Moreover, self-regulatory and ability factors had the highest predictive value for handwashing frequency.

The prominent role of self-efficacy suggests that the feeling of being able to regularly wash hands with soap at critical junctures is strongly influenced by the built environment and by a household's economic status. Contrary to the theory of triadic influence, which states that self-efficacy is ultimately influenced by relatively stable biological predispositions and personality characteristics (Flay et al., 2009), in this study, self-efficacy seems rather to be especially associated with determinants of the built environment, whereas the direction of causality remains to be clarified. Then again, as already discussed in Chapter I, the theory of triadic influence does not take the built environment into consideration when explaining how behaviours are shaped and reinforced. Interestingly, handwashing frequency seemed to be unaffected by personal attributes, such as education, gender, and age. The results of the study presented in Chapter III emphasize the importance of considering contextual factors when designing handwashing interventions and strongly suggest that the relative influence of the built environment and of social-cognitive determinants should be ascertained, since on the one hand, contextual constraints might be perceived rather than actual barriers, and on the other hand, contextual facilitators can provide the affordances that allow a person's self-efficacy and self-regulation to be enhanced.

4. The development of a school intervention programme creating enabling environments for handwashing practices

The goal of the last study presented in this thesis (Chapter IV) was to derive practical strategies for a handwashing programme to be implemented in primary schools in rural Burundi and urban Zimbabwe. Customized handwashing interventions were derived from the RANAS systematic approach to behaviour change. The quantitative surveys used to assess the RANAS social-cognitive determinants underlying school children's handwashing practices formed the basis of calculations of intervention potentials to select those determinants with the highest intervention potential. The calculations revealed that social norms and self-efficacy should be targeted in both countries, while in Burundi, perceived severity should also be targeted by the campaign, and in Zimbabwe, health knowledge. Qualitative observations of school handwashing characteristics further showed that few schools had soap readily available and, especially in Burundi, not all the school had access to running water. Based on the RANAS systematic approach of behaviour change and following the suggestions of prior research, appropriate behaviour change techniques were chosen. Information interventions were selected to raise the children's perceived seriousness of contracting diarrhoea in Burundi

and to enhance knowledge acquisition among school children in Zimbabwe (Albarracín et al., 2005; Bandura, 2004; Fisher & Fisher, 1992; Stanton et al., 1992). Infrastructural interventions were proposed to enhance the children's self-efficacy and thus their confidence in their ability to wash hands after using the latrine (Bandura, 1982; Rosenstock, 1974). Lastly, an intervention highlighting the commonness of handwashing at every school was chosen to tackle social norms (Abraham, 2012). For each intervention type, a corresponding behaviour change technique was chosen using the RANAS systematic approach to behaviour change.

In light of the results of the preceding studies, each behaviour change technique selected relates to specific components of the environment. First, information interventions are meant to sensitize the children to the issue of diarrhoea by providing information about transmission routes, handwashing steps, and critical junctures for washing hands. Creating an appropriate information environment in which relevant and reliable information is provided and accessible is a prerequisite to addressing knowledge gaps and perceived severity (Jerit, Barabas, & Bolsen, 2006; Sallis et al., 2006). Indeed, several studies have shown that raising awareness of the importance of handwashing and increasing hygiene knowledge leads to an improvement in proper handwashing (e.g., O'Reilly et al., 2008; Patel et al., 2012).

Secondly, as suggested in the study presented in Chapter III, self-efficacy can best be enhanced by providing an enabling built environment, which was indeed found to be lacking across all schools. The behaviour change technique selected is meant to increase the children's confidence in behaviour performance by providing infrastructure. Ecological psychology asserts the relevance of behaviour settings (Barker, 1968), and the importance of supplies for handwashing has been documented in a systematic review on water and sanitation in schools (Jasper et al., 2012). Several studies have shown that, for handwashing with soap to take place, soap and water must be readily and conveniently accessible when needed (e.g., Biran et al., 2008; Luby, Halder, et al., 2009; Steadman Group, 2007). Programmes providing buckets for handwashing were successful in increasing scores on a handwashing demonstration (Blanton et al., 2010; Patel et al., 2012), and programmes providing soap for handwashing achieved overall increases in children's handwashing practices (Caruso et al., 2014; Saboori et al., 2013). As Grimason et al. (2014) rightfully concluded, the presence of facilities and supplies is necessary, but not sufficient. Their design should be convenient for school purposes and adapted to children's needs. The infrastructural interventions planned

thus propose to equip each classroom with a simple handwashing device along with a dispenser filled with soapy solution in place of bar soap.

Lastly, a normative intervention to highlight the commonness of handwashing at every school was chosen to tackle social norms (Abraham, 2012). The intervention is meant to create a handwashing culture at school and to emphasize the influence of important social relations including peers and teachers. A kick-off event is envisaged to introduce the new handwashing stations along with a song emphasizing the critical junctures for washing hands. Each class is to create posters on the topic of handwashing, thus committing to being a handwashing class, a behaviour change technique proposed to raise social norms (Mosler, 2012). As was the case for *The Great WASH Yatra* (Chapter II), this kick-off event is meant to target social norms by demonstrating that all classes are committed to washing hands with soap at school. By introducing new hardware and by actively involving the teachers in the programme implementation, washing hands with soap should become common practice, thus increasing the descriptive norm at each school (Curtis et al., 2009; Scott, Curtis, et al., 2007).

In the school context, laws, policies, and economic conditions are particularly important. As discussed in the introductory chapter, primary schools would benefit from more favourable policies considering that key barriers include inadequate access to water, lack of handwashing facilities, and inadequate budgets for purchasing soap (e.g., Monney et al., 2014; Steadman Group, 2007). Lack of supplies and facilities for handwashing are primarily due to financial constraints on school budgets, but they are also the consequence of little institutional support and inactive school management committees, schoolteachers, and local health workers (Grimason et al., 2014; Saboori et al., 2011). To address these issues, an active involvement of different stakeholders is recommended for the programme implementation. Workshops in each country already took place and comprehensively involved local stakeholders, such as school teachers, health centre staff, and the local administration in the development of the programmes to have them locally adapted to the social and cultural contexts. As a result of these workshops, the programmes will mainly be implemented by school teachers who are guided by health centre personnel, thus enabling teachers to continue the activities beyond the project phase. As part of the policy dialogue, national stakeholders will be invited to the official kick-off events to increase their commitment. An implementing agency is needed to communicate with government institutions, residence associations, opinion leaders, public representatives and spokespersons of targeted communities, liaise with primary schools and the personnel of the local health centres, ensure the availability of proper handwashing

facilities, and supervise, guide, and support local primary school staff to facilitate the accurate implementation of interventions. In both countries, policy dialogues at provincial and ministerial levels are needed to influence the allocation of funds for soap and to ensure availability of water in schools. A comprehensive follow-up survey will allow a rigorous evaluation of the programmes and assess their success in creating the necessary environments in order to influence the social-cognitive determinants and to eventually induce sustainable handwashing practices among primary school children.

5. Strengths and limitations

While handwashing compliance has been studied in many different settings and contexts, this thesis is the first to document and analyse the influence of contextual aspects on social-cognitive determinants of handwashing behaviour in infrastructure-restricted settings across different target groups and in different geographic areas. The findings complement and extend previous studies in explaining and predicting handwashing practices in developing countries. The consideration of different contextual influences allows a more effective understanding of the social and physical environmental conditions that influence health behaviour in interaction with social-cognitive determinants. Taking contextual aspects into account when trying to predict and understand handwashing behaviour was relevant with a range of target groups in different settings and cultures in an interesting and informative manner. Another strength is the consistent application of the RANAS methodology to design, adapt, pre-test, and implement the surveys. Moreover, the results are not only shared with the scientific community; at every stage of the project, results were also shared with partners and stakeholders, providing them with the opportunity to use data to improve future processes and policy making. While all three studies provide valuable information about contextual and social-cognitive factors pertaining to handwashing frequency, the findings should be interpreted with limitations in mind, including study designs, sample sizes, and the measures used in the studies.

5.1. Study designs and sample sizes

The studies presented in Chapter III and Chapter IV were cross-sectional studies on the factors influencing handwashing, so relationships between variables are descriptive and do not imply causality. Still, the results have been confirmed by previous work focusing on

caregivers' and school children's handwashing practices in similar settings (Contzen & Mosler, 2015; Lopez-Quintero et al., 2009; Setyautami et al., 2012). Only experimental studies can help understand the relations and interactions between contextual and social-cognitive factors and how they affect handwashing behaviour. As Contzen and Mosler (2015) have observed, longitudinal or experimental studies are necessary, for which larger sample sizes and increased resources would be needed. For the study evaluating the effect of *The Great WASH Yatra*, a high response rate was achieved from campaign visitors, and follow-up rates were high. However, no control group was included for direct comparison. It is not possible to draw conclusions about the causal influence of participating in certain activities, as visitors were self-selected to participate in games and experienced diverse combinations of activities. Similar events should be restricted to a few interactive games with a focus on the determinants relevant to handwashing with soap. Fewer people per activity could result in more active participation and more effective spreading of the hygiene messages. In Burundi and Zimbabwe, study populations were restricted to 20 school catchment areas. The samples are not statistically representative of rural Burundi or urban Zimbabwe, and determinants of handwashing and their interactions may be different in other settings. Thus, the findings may not be generalizable to other contexts. Still, study participants were selected from among the high-need populations of rural Burundi and urban Zimbabwe. Due to the large sample sizes, differences with no real practical relevance could reach statistical significance. Nonetheless, all studies were exploratory, aiming at hypothesis generation, so conclusions can and should be viewed as preliminary.

5.2. Measures

Although the survey tools were not validated or tested for reliability, similar questionnaires have been used in other studies on handwashing behaviour (Contzen & Mosler, 2013) and water treatment (Huber & Mosler, 2013; Inauen, Tobias, et al., 2013). The adaptation of the questionnaire for the primary school children was based on in-depth interviews and focus group discussions. The items were adapted to the local cultural context and translated into the local language in each case. While exploratory factor analyses confirmed the dimensionality of the subscales, confirmatory factor analyses would have provided a more rigorous test and a better indication of both the essential dimensions and specific items that could have been excluded due to unreliable measurement. The surveys may also have omitted important

factors. Although the behavioural determinants were found to explain a large amount of the variance in the outcomes, they may be further complemented with additional variables.

Findings in this thesis relied on self-reports of behavioural outcomes. Objective behaviour measures may be preferred, as they overcome problems of self-reports such as response shifts, recall bias, and social desirability (e.g., G. S. Howard, 1980). In Burundi and Zimbabwe, observational data were also collected. Due to time and budget constraints, observations took place in half of the households for three hours only, and school observations were limited to two consecutive days. Unfortunately, the number of critical events observed was too small to be used as an outcome measure in the analyses. Indeed, Halder, Molyneaux, Luby, and Ram (2013) found that decreasing the duration of structured observation disproportionately reduces the opportunity to measure a number of critical events. While planning future data collection on handwashing behaviour, more financial, personnel, and time resources should be budgeted for. Nonetheless, even though over-reporting bias for handwashing frequency is very likely (e.g., Curtis et al., 1993; Halder et al., 2010; Manun'Ebo et al., 1997), there is evidence that self-reported handwashing is associated with child diarrhoea and cholera incidence (e.g., Hutin, Luby, & Paquet, 2003; Luby et al., 2011).

Since the findings of the study reported in Chapter II stem from an on-site visitor survey, it was not possible to examine whether the visitors' intention to wash hands was actually translated into practice. The limitations in using intention measures instead of actual behaviour measures have already been acknowledged. Nonetheless, the use of intention as a proxy for behavioural consequences is consistent with the literature (Armitage & Conner, 2001; Sheeran, 2002). Moreover, literature reviews have shown that intentions indeed correlate strongly with behaviour uptake (Eccles et al., 2006; Webb & Sheeran, 2006). Finally, the goal of these studies was not to report and analyse absolute handwashing rates, but rather to assess the relative impact of the different contextual and psychosocial factors on handwashing frequency.

Of course, additional research on contextual and social-cognitive factors of handwashing behaviour is required to provide more information and evidence for designing effective intervention programmes. However, despite these limitations the work presented here is a good starting point for investigating the influence of and interaction between different contextual and social-cognitive factors on handwashing with soap.

6. Appraisal of the proposed health behaviour framework

A theoretical framework was proposed to identify the most important aspects of contextual influences. The aim of this compilation was to extend social-cognitive determinants of health behaviour so that characteristics of the physical and social environments as well as personal attributes are investigated simultaneously. Although research evaluation of the model was not the primary intent, the studies conducted allow an appraisal of some of the propositions.

In similar fashion to the distinction made in the health action process approach (Schwarzer, 2008), the findings of the studies included in this thesis indicate that different environmental factors affect different social-cognitive determinants. Schwarzer (2008) suggests distinguishing between a motivation phase, which creates intention, and a volition phase, which leads to the actual health behaviour. Risk perception, attitudes, and social norms contribute to intention building, whereas self-regulation factors contribute to behaviour performance (Mosler, 2012). According to Schwarzer (2008), action self-efficacy refers to the initial motivation phase, whereas maintenance and recovery self-efficacy are instrumental in the subsequent volition phase. The wording of the items assessing self-efficacy in the studies of this thesis assess maintenance self-efficacy rather than actual action self-efficacy, since respondents were asked about how confident they feel about always washing hands with soap at critical junctures. The present findings suggest a very clear pattern, which is that risk beliefs, attitudes, and norms are mostly influenced by the social environment, including culture, laws and policies, economic conditions, and social relations, and that abilities and self-regulation factors are mainly affected by the physical environment, both natural and built. Figure 5 depicts the particular streams of influence from the social and physical environments on the different social-cognitive factor blocks of the RANAS model.

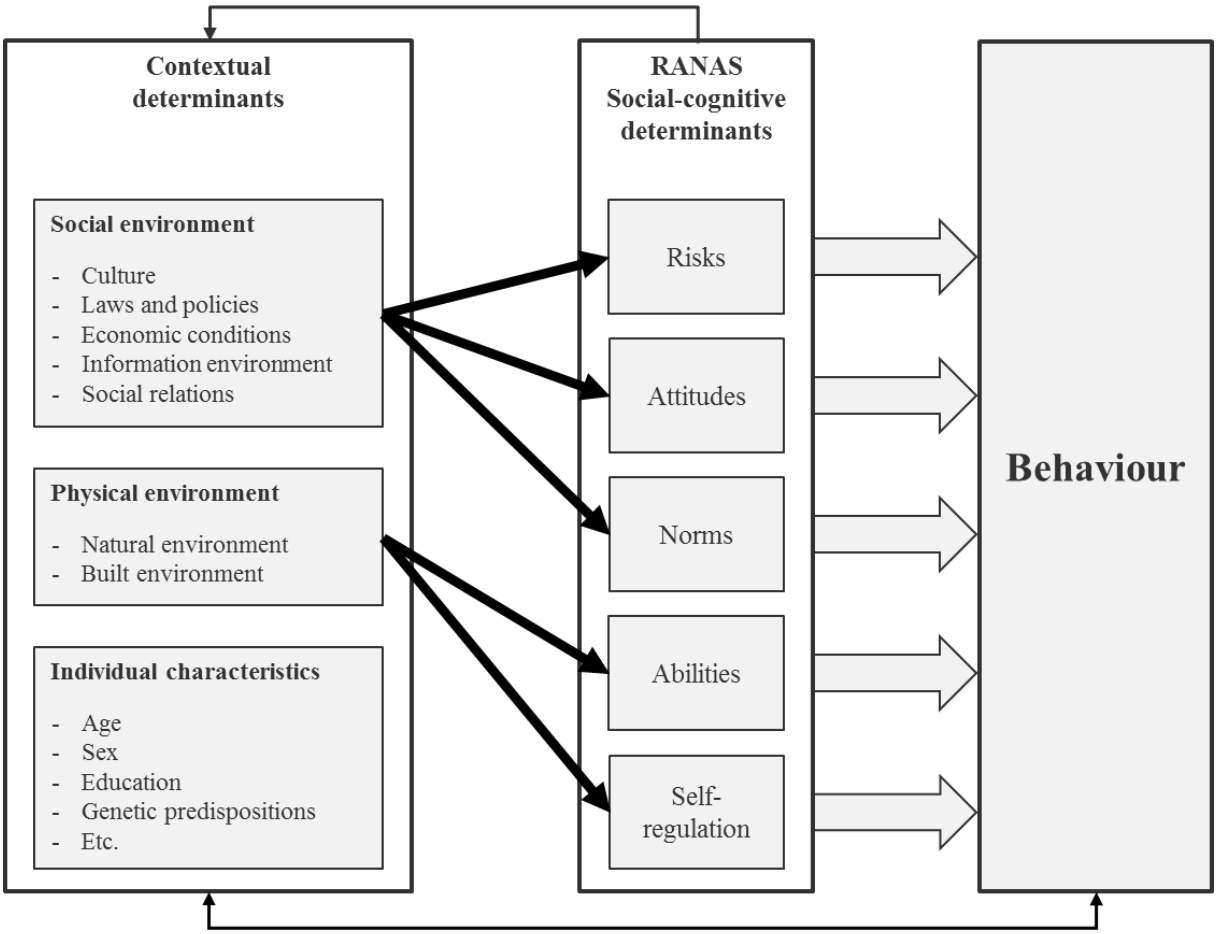

Figure 5. Streams of influence within the proposed health behaviour framework.

Social-cognitive and contextual determinants may influence handwashing behaviour through various potentially additive and interactive ways. In line with the theory of triadic influence (Flay et al., 2009), the findings of this thesis indeed suggest that contextual factors are more causally distal to behaviour and have effects that are mediated through social-cognitive variables that are causally proximal to behaviour. Even though it is assumed that the effects of contextual factors are indirect and mediated by behaviour-specific cognitions, it is very unlikely that their effects on behaviour are entirely accounted for by their impact on the more proximal social-cognitive determinants (Abraham et al., 2011) (see bottom arrow in Figure 5).

Sallis et al. (2008) state that the weakness of many ecological models is their lack of specificity about hypothesized influences, putting a greater burden on practitioners to identify critical factors for successful interventions. Diez-Roux (1998) rightly observed that the most challenging aspect of applying multi-level frameworks is that they require a theory of

causation that integrates variables at different levels and explains these relationships and interactions across levels. Individual-level social-cognitive determinants of health behaviour are easier to measure and thus more likely to serve as a basis for interventions. Measuring environmental conditions is challenging, and research based on ecological models is more demanding than behavioural research at a single level (Sallis et al., 2008). A huge range of measures is needed to adequately investigate relationships between environmental and social-cognitive determinants of health behaviour (Abraham et al., 2011). As remarked by Golden and Earp (2012), validated methods for measuring the social and physical environment remain limited or poorly adopted, and application of these constructs for programme evaluation is rare in the public health literature. Well-defined interventions at individual level with easily measurable objectives may hold more appeal for practitioners (Golden & Earp, 2012). Still, it remains important to explore and map relationships between environmental characteristics that cannot be modified at an individual level and more proximal, individually modifiable cognitions. The need to include a range of measures of the social and physical environment to better understand handwashing practices is highlighted by these findings. A more integrated and multidisciplinary approach to understanding health behaviour should remain an aspiration, and models can be simplified by focusing on individual and environmental leverage factors that are most salient for a given health outcome (Grzywacz & Fuqua, 2000).

7. Implications for practice

A key strength of the proposed framework is the focus on multiple levels of influence and the identification of a comprehensive array of contextual factors relevant to handwashing behaviour. Although the proposed framework and the findings of the studies provide an ecological perspective and a more comprehensive view of handwashing behaviour, they do not yet provide a parsimonious base on which to develop interventions. The difficulty of implementing multi-level interventions should not be underestimated. For example, the effort and time required to change policies can be a deterrent to practitioners (Sallis et al., 2008). However, the effectiveness of health promotion efforts can be enhanced through multilevel interventions (Stokols, 1992b).

Flay et al. (2009) remark that, although complex, if environmental changes are achieved, they may have a more lasting effect on behaviour because they become incorporated into structures, systems, and policies and can reach entire populations. Interventions that only address factors at the individual level might be ineffective if the social and physical

environment do not permit or encourage performance of the new behaviour. Since developing and implementing interventions that influence all aspects of the environment and characteristics of the individual is cumbersome and impractical, Stokols (1996) recommended focusing on at least two levels of influence. Expecting interventions to focus on multiple environmental dimensions is unrealistic, given the limited scope and resources of most projects (Golden & Earp, 2012). A full assessment of the different contextual factors affecting a health issue in a specific setting might reveal that an intervention targeting a single leverage point is the most effective way to induce behaviour change, suggesting that even single-level interventions are not inconsistent with a social ecological approach (Golden & Earp, 2012).

The studies presented in this thesis show that handwashing is the consequence of multiple influences from contextual and social-cognitive factors. Although these influences are interdependent, some have more effect than others, and the complexity of social-cognitive, and contextual factors must be considered and investigated when designing handwashing interventions. Changing handwashing behaviour has proved to be a challenging task (Larson & Kretzer, 1995; Luby, Agboatwalla, et al., 2009; Whitby et al., 2007). The findings of this thesis emphasize the importance of creating an enabling environment. A physical environment facilitating handwashing practices has proved essential for proper and regular handwashing (Kaplan & McGuckin, 1986; Luby & Curtis, 2008; Mariwah, Hampshire, & Kasim, 2012). It is thus necessary to address constraining factors, such as the availability of soap and a convenient water source, and create enabling social conditions with a rich information environment and favourable laws and policies (e.g., Biran et al., 2005; Curtis et al., 2009; Schmidt et al., 2009). As stated in the last paper of this thesis, the school environment represents an important setting for children, because social habits and behaviours are learned at school (Jasper et al., 2012). Since handwashing is more frequent if facilities are readily available (e.g., Blanton et al., 2010; Saboori et al., 2013), commitment from government and school officials to providing appropriate water infrastructure and soap at schools may improve the sustainability of behaviour change (Bowen et al., 2007). Many factors are necessary for fostering an environment in which children can practise regular handwashing at school. Saboori et al. (2011) nicely summarizes the domains that should be targeted so as to guarantee an enabling environment at school: financial capacity; accountability; technical feasibility and availability; community support; school leadership and management; and student engagement. Future research is needed to elucidate the interactions between contextual and social-cognitive determinants and should consider a

broader range of environmental factors that might affect handwashing, such as climate, access to markets, and cultural traditions.

8. General conclusions

Increasing handwashing with soap at critical junctures is one of the most effective public health interventions for reducing childhood diarrhoea in developing countries. Considering that handwashing with soap at critical junctures is far from a universal practice, effective approaches to promoting handwashing are needed. In order to effectively promote a desired behaviour, it is first of all important to understand what influences and determines it. The aim of this thesis was to contribute to the prediction and understanding of handwashing behaviour in infrastructure-restricted settings by looking specifically at how contextual factors influence behaviour in interaction with social-cognitive determinants.

The on-site evaluation of a handwashing promotion event in rural India showed that a unique social, cultural, and informational environment was successful in changing visitors' knowledge, attitudes, and social norms regarding handwashing. The findings from a study investigating how the physical environment impacts handwashing frequency among caregivers in rural Burundi emphasize the added value of considering contextual factors and how they affect ability and the self-regulation factors underlying handwashing behaviour. In the last study, a handwashing programme to be implemented in primary schools in rural Burundi and urban Zimbabwe was developed by selecting social-cognitive determinants to target on the basis of quantitative evidence and qualitative observational findings of school handwashing characteristics. In light of the results of the preceding studies, the behaviour change techniques selected relate to specific contextual factors to create an enabling environment for handwashing practices at school.

Looking back at the core principles of ecological models, the findings of this thesis were able to elucidate some initial dynamic interactions among environmental factors and social-cognitive determinants, suggesting that risk, attitude, and norm factors are mostly influenced by the social environment, whereas ability and self-regulation factors are mainly affected by the physical environment. The framework was applied to the specific prediction of handwashing behaviour in infrastructure-restricted settings and used to design school handwashing interventions that target multiple determinants at different levels. Expanding social-cognitive models to incorporate contextual influences is likely to enhance

understanding of handwashing behaviour and thus to improve interventions. Hopefully, both researchers and practitioners will take into consideration the importance of favourable social and physical environments and how they interact with specific social-cognitive factors when trying to better understand and promote life-saving handwashing behaviour.

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Appendix

Appendix I: Supplementary Material Chapter II

Appendix II: Supplementary Material Chapter III

Appendix III: Supplementary Material Chapter IV

Appendix I: Supplementary Material Chapter II

Description of the games and activities of The Great WASH Yatra

Table 13. Description of Games and Activities

Game / Activity ***Hindi name***	**Description**
Clean Hands Challenge *Chappa Chapp*	Germs are marked out on a large hand shaped cut-out. The germs act as targets which the players have to successfully hit with a wet soapy sponge.
Germ Attack *Dishoom*	Participants have to successfully hit a minimum of two germs suspended from a ceiling, using balls representing soap bubbles.
Germ Pyramid *Dho Dala*	Participants have to topple a pyramid using balls representing soap bubbles in three tries. The pyramid is made using cans with graphics depicting germs.
Complete the Picture *Aao Milao*	Participants compete against time to complete a giant jigsaw puzzle with motives related to handwashing messages and techniques.
Tic Tac Toe *Teen Behetereen*	Similar to Tic-Tac-Toe, the goal is to throw three soap bubble balls onto a line of germs.
Cricket Wheel of Fortune *Run Chakkar*	Each player gets several spins on the wheel. In each spin, the player needs to answer a sanitation themed question. The player which gets most correct answers wins the game.
Kinect Handwashing Games *Fundo Haath Ki Safai*	Participants have to mimic handwashing movements to keep the sets of hands on the screen clean. The hands on the screen keep getting dirtier faster as time passes. The tracker following the hands of the participant is in the shape of a bar of soap. Rubbing it across the hands while facing the screen cleans them.
Poo Minefield *Khatron Ke Khiladi*	Played in pairs, with one player verbally guiding the other player, who is blindfolded, through a field filled with "mines" representing poo that should be avoided and soap bars to collect. The challenge is for the blindfolded player to walk from one side of the field to the other while avoiding stepping on poo and collecting as many soap bars as possible.
Ludo *Ludo*	As a variation of the standard Ludo (Parcheesi) board game, the game involves 2-4 players. The goal is to race from homes to the toilet through dice rolls, while avoiding diarrhoea penalty tiles and seeking handwashing bonus tiles.

Game / Activity ***Hindi name***	**Description**
Poo Pairs *Judwa Takdeer*	Poo pairs is a card game in which all of the cards are laid face down on a surface and two cards are flipped face up over each turn. The object of the game is to turn over pairs of matching cards. The images on the cards are handwashing and sanitation messaging (like mini-posters).
Snakes & Ladders *Saap Seede*	This game is played by 2-6 players. Players race to the finish through dice rolls. If a player lands on a germ tile, they are pushed back, whereas soap tiles help to advance in the race.
Clean Hands Carrom *Nirmal Bharat Striker*	Hands were painted in the centre of a traditional Indian board game. The object of the game was to flick a striker disk, representing soap, to hit and move lighter disks, representing germs, into one of four corner pockets.
Soap Lab	Participants experience how their health can be affected if they do not wash their hands with soap. Through ultra-violet light, they are able to see the effectiveness of using soap in addition to water to remove germs. The Soap Lab also features a tippy-tap handwashing station, a simple facility that can be constructed with minimum financial resources.

Questionnaires of the on-site visitor survey of The Great WASH Yatra (English version)

Water and Hygiene Practices in India

Yatra on-site evaluation – Pre

G50 Number of visitors not wanting to be interviewed: .....

G02 Date of the interview (DD.MM.YYYY): .....

G03 Name of the interviewer: .....

G04 Number of the interviewer: .....

G05 Interview start time: .....

G44 Yatra station: .....

G53 Code for Post-Questionnaire: .....

General information

G06 Name of the interviewee: .....

G22 Gender: [1] ❑ Male [2] ❑ Female

G23 Age: ..... [99] ❑ I don't know

G24 Marital status: [1] ❑ Single [2] ❑ Married [3] ❑ Widowed [4] ❑ Cohabiting [5] ❑ Divorced/Separated

G25 Are you able to read or write? [1] ❑ Can neither read nor write [2] ❑ Can read only [3] ❑ Can write only [4] ❑ Can both read and write

G26 Years of education: [1] ❑ None [2] ❑ I-IV [3] ❑ V-VIII [4] ❑ IX-XII [5] ❑ Above XII [88] ❑ Other: ..... [99] ❑ Can't remember

G27 Religion: [1] ❑ Hindu [2] ❑ Muslim [3] ❑ Christian [4] ❑ Sikh [5] ❑ Buddhist [6] ❑ Animist [7] ❑ Jain [8] ❑ Parsi [9] ❑ none [88] ❑ Other: .....

Official use:
Checked: ❑ Yes Initials: _____ **Data entered:** ❑ Yes Initials: _____

G01 Questionnaire ID number (official use): .....

"Nirmal Bharat Yatra"

C01y During the past three months, have you seen, read or heard any advertising about the "Nirmal Bharat Yatra"?

1 ❑ Yes 2 ❑ No 99 ❑ I don't know

C02y IF YES TO C01: Where did you see, read or hear this advertising about the "Nirmal Bharat Yatra"?

1 ❑ TV 2 ❑ Radio 3 ❑ Magazine/Newspaper 4 ❑ Cinema 5 ❑ Poster 6 ❑ Website
7 ❑ Word of mouth 8 ❑ Brochure/Booklet 10 ❑ Local area health service
11 ❑ Auto Rickshaw 12 ❑ Panchayat 13 ❑ Eawag survey
88 ❑ Other: ..... 99 ❑ I don't know

C03y How many times would you estimate that you have seen, read or heard advertising about the "Nirmal Bharat Yatra" over the past three months? …… times

C61 Do you know what the "Nirmal Bharat Yatra" mela is about?

1 ❑ Hygiene and sanitation 2 ❑ Handwashing 3 ❑ Stop open defecation / use toilet 4 ❑ Safe drinking water
88 ❑ Other: ..... 99 ❑ I don't know

Handwashing behavior

I am now going to ask you questions about handwashing

B00x OPEN QUESTION: In general, why do you wash your hands?
MORE THAN ONE ANSWER POSSIBLE.

1 ❑ Against bacteria (to avoid bacteria/germs/microbes)
2 ❑ Against sickness (to avoid sickness/illness/infection)
3 ❑ Against diarrhea
4 ❑ To protect health (to protect health/body/life)
5 ❑ Habit (it's what I'm used to/what I have always done/it's a habit)
6 ❑ Because of hygiene **WHY?**
7 ❑ Hands get dirty / smelly /sticky
8 ❑ Compliance/obligation (they told me so/I have to) **WHY?**
9 ❑ Group behavior (everyone does it)
99 ❑ I don't know
88 ❑ Other: .....

B01 OPEN QUESTION: What is the main source of water used by your household for handwashing?

1 ❑ Piped water in the house 2 ❑ Piped water in the yard 3 ❑ Public tap or standpipe
4 ❑ Tube well/borehole 5 ❑ Protected dug well 6 ❑ Unprotected dug well
7 ❑ Protected spring 8 ❑ Unprotected spring 9 ❑ Rainwater
10 ❑ Tanker truck/cart with tank 11 ❑ Surface water (river/dam/lake/pond/stream/canal/irrigation channel)
12 ❑ Purchased bottled water 13 ❑ Hand pump 88 ❑ Other: .....

B02 OPEN QUESTION: With what do you usually clean your hands?
ASK OPEN-ENDED AND CHECK THE ACCORDING BOX.

1 ❑ Only water
IF ONLY WATER, ASK WHICH OF THE OTHER AGENTS IS PREFERRED AND CHECK THIS BOX IN ADDITION
2 ❑ Only ash 3 ❑ Only sand 4 ❑ Soap & water 5 ❑ Ash & water 6 ❑ Sand & water
88 ❑ Other: .....

B03 Do you have soap for handwashing in your household today? 1 ❑ Yes 2 ❑ No

B04 Have you washed your hands with soap and water during the last 24 hours 1 ❑ Yes 2 ❑ No

B05 IF YES TO B04:

OPEN QUESTION: What was the reason you washed your hands with soap during the past 24 hours?

MORE THAN ONE ANSWER POSSIBLE.

- 1 ❑ After using the toilet
- 2 ❑ After wiping a child's bottom
- 3 ❑ After other kinds of contact with feces
- 4 ❑ Before eating
- 5 ❑ After eating
- 6 ❑ Before cooking, cutting or preparing food
- 7 ❑ Before feeding a child
- 8 ❑ When they are dirty/smelly/sticky etc. (WHY WERE THEY...?)
- 99 ❑ I don't know
- 88 ❑ Other: .....

B12 Before you eat, how often do you wash your hands with soap and water?

1 ❑ Never (Almost never)	2 ❑ A few times (less than half of the times)	3 ❑ Sometimes (about half of the times)	4 ❑ Often (more than half of the times)	5 ❑ Always (Almost always)

B15 Before you cook, cut, or prepare food, how often do you wash your hands with soap and water?

1 ❑ Never (Almost never)	2 ❑ A few times (less than half of the times)	3 ❑ Sometimes (about half of the times)	4 ❑ Often (more than half of the times)	5 ❑ Always (Almost always)

B17y After using the toilet, how often do you wash your hands with soap and water?

1 ❑ Never (Almost never)	2 ❑ A few times (less than half of the times)	3 ❑ Sometimes (about half of the times)	4 ❑ Often (more than half of the times)	5 ❑ Always (Almost always)

Attitude towards handwashing

I am now going to ask you a few questions about health issues

F08x OPEN QUESTION: Can you tell me what causes diarrhea?

MORE THAN ONE ANSWER POSSIBLE.

- 1 ❑ Contaminated food / Diarrhea germs in food
- 2 ❑ Eat hot / spicy food
- 3 ❑ Contaminated water / Diarrhea germs in water
- 4 ❑ Indigestion of milk / dairy products
- 5 ❑ Lack of water
- 6 ❑ teething
- 7 ❑ Diarrhea germs
- 8 ❑ Not washing hands with soap/ash/sand
- 9 ❑ Germs
- 10 ❑ Not washing hands after contact with feces
- 11 ❑ Germs in food or water
- 12 ❑ Not washing hands
- 13 ❑ Drink untreated water
- 14 ❑ Bad hygiene
- 15 ❑ Not washing hands before eating / eat with dirty hands
- 16 ❑ Defecate anywhere/not using latrine/not bury the feces
- 17 ❑ Not washing hands before preparing food
- 18 ❑ Hot weather
- 19 ❑ Eat outside food / junk food
- 20 ❑ Season change
- 21 ❑ Overeating
- 22 ❑ Open defecation
- 23 ❑ Flies
- 99 ❑ I don't know
- 88 ❑ Other: .....

F10 OPEN QUESTION: Can you tell me how you can prevent getting diarrhea?

MORE THAN ONE ANSWER POSSIBLE.

- 1 ❑ Treating water / Chlorinate water
- 2 ❑ Good household hygiene / good hygiene
- 3 ❑ Boil food long enough
- 4 ❑ Wash hands often with soap/ash/sand
- 5 ❑ Wash hands with soap/ash/sand before eating
- 6 ❑ Wash raw food with safe water
- 7 ❑ Wash hands with soap/ash/sand before preparing food
- 8 ❑ Cover the food (from flies)
- 9 ❑ Wash hands with soap/ash/sand before feeding a child
- 10 ❑ Wash hands with soap/ash/sand after defecation
- 11 ❑ Wash hands with soap/ash/sand before breastfeeding a child
- 12 ❑ Wash hands with soap/ash/sand after wiping a child's bottom
- 13 ❑ Clean food preparation areas and kitchenware
- 14 ❑ Burying feces / using latrines for defecation
- 15 ❑ Cover latrines
- 99 ❑ I don't know
- 88 ❑ Other: .....

F01 How high do you feel is the risk that you get diarrhea?

[1] ❑ No risk [2] ❑ Little risk [3] ❑ Quite a risk [4] ❑ A risk [5] ❑ High risk

F04y Imagine you contracted diarrhea, how severe would be the impact on your life in general?

[1] ❑ Not severe at all [2] ❑ A little severe [3] ❑ Quite severe [4] ❑ Severe [5] ❑ Very severe

I am now going to ask you some more questions about handwashing

F20 How much do you like or dislike washing hands with soap and water?

Rather dislike it			Rather neutral			Rather like it		
[1] ❑	[2] ❑	[3] ❑	[4] ❑	[5] ❑	[6] ❑	[7] ❑	[8] ❑	[9] ❑
Dislike it very much	Dislike it	Quite dislike it	Slightly dislike it	Neither dislike nor like it	Slightly like it	Quite like it	Like it	Like it very much

F17 Do you feel more attractive when you wash your hands with soap and water?

[1] ❑ Not at all more attractive [2] ❑ A little more attractive [3] ❑ Quite more attractive [4] ❑ More attractive [5] ❑ Very much more attractive

F11 Do you think that washing hands with soap and water is expensive?

[1] ❑ Not expensive [2] ❑ A little expensive [3] ❑ Quite expensive [4] ❑ Expensive [5] ❑ Very expensive

F13 Do you think that washing hands with soap and water takes a lot of effort?

[1] ❑ Takes no effort [2] ❑ Takes little effort [3] ❑ Takes quite effort [4] ❑ Takes effort [5] ❑ Takes much effort

F46 How strongly do you try to wash hands with soap and water?

[1] ❑ Not at all [2] ❑ Little [3] ❑ Some [4] ❑ Much [5] ❑ Very much

F40 How confident are you that you can wash hands with soap and water even if urgent tasks arise which interfere with handwashing?

[1] ❑ Not confident [2] ❑ A little confident [3] ❑ Quite confident [4] ❑ Confident [5] ❑ Very confident

F42 Imagine you have stopped washing hands with soap and water for several days, for example because there was no water for handwashing. How confident are you to start washing hands again?

[1] ❑ Not confident [2] ❑ A little confident [3] ❑ Quite confident [4] ❑ Confident [5] ❑ Very confident

F51 When you think about the last 24 hours: how often did it happen that you intended to wash hands with soap and water and then forgot to do so? …… times.

F48 What do you do when you want to wash your hands and there is no soap for handwashing?

[1] ❑ Don't use soap [2] ❑ Alternative: .....

F60 When you think about the last 24 hours, how often did it happen that you intended to wash hands with soap and water, but were hindered in doing so? …… times.

F24y Do you feel dirty if you don't wash your hands with soap and water after using the toilet?

[1] ❑ Don't feel dirty [2] ❑ Feel a little dirty [3] ❑ Feel quite dirty [4] ❑ Feel dirty [5] ❑ Feel very dirty

F64y How important is it for you to wash hands with soap and water after using the toilet?

[1] ❑ Not important [2] ❑ A little important [3] ❑ Quite important [4] ❑ Important [5] ❑ Very important

F66y Do you feel committed to wash hands with soap and water after using the toilet?

[1] ❑ Not committed [2] ❑ A little committed [3] ❑ Quite committed [4] ❑ Committed [5] ❑ Very committed

F30y Do you feel a personal obligation to wash hands with soap and water after using the toilet?

[1] ❑ No personal obligation [2] ❑ Weak personal obligation [3] ❑ Medium personal obligation [4] ❑ Strong personal obligation [5] ❑ Very strong personal obligation

F33y Do you think you are able to always wash hands with soap and water after using the toilet?

[1] ❑ Not able [2] ❑ A little able [3] ❑ Quite able [4] ❑ Able [5] ❑ Very able

F59y How much do you feel that you wash your hands with soap and water after using the toilet as a matter of habit?

[1] ❑ Not a habit [2] ❑ A weak habit [3] ❑ Quite a strong habit [4] ❑ A strong habit [5] ❑ A very strong habit

F38y How difficult is it to find the time to wash hands with soap and water after using the toilet?

[1] ❑ Not difficult [2] ❑ A little difficult [3] ❑ Quite difficult [4] ❑ Difficult [5] ❑ Very difficult

F53y How strongly do you intend to always wash hands with soap and water after using the toilet?

[1] ❑ Not at all strongly [2] ❑ A little strongly [3] ❑ Quite strongly [4] ❑ Strongly [5] ❑ Very strongly

F26y How many people of your family wash hands with soap and water after using the toilet?

[1] ❑ (Almost) nobody [2] ❑ Some of them [3] ❑ Half of them [4] ❑ Most of them [5] ❑ (Almost) all of them
[99] ❑ I don't know

F29y People who are important to you, do they rather think you should or you should not wash your hands with soap and water after using the toilet?

Rather should not			Rather neutral			Rather should		
[1] ❑ Nearly all think I should no	[2] ❑ Most think I should not	[3] ❑ Quite more than half think I should not	[4] ❑ Slightly more than half think I should not	[5] ❑ The same amount think I should not and I should	[6] ❑ Slightly more than half think I should	[7] ❑ Quite more than half think I should	[8] ❑ Most think I should	[9] ❑ Nearly all think I should

[99] ❑ I don't know

F16y How certain are you that washing hands with soap and water after using the toilet prevents you and your family from getting diarrhea?

[1] ❑ Not certain [2] ❑ A little certain [3] ❑ Quite certain [4] ❑ Certain [5] ❑ Very certain

General information

G32 What is your occupation? .....

G34 Monthly income: ..... Rupees [99] ❑ I don't know

G35 Monthly expenditure: ..... Rupees [99] ❑ I don't know

Observation

O21 Cleanliness of hands

[1] ❑ Visible dirt [2] ❑ Unclean appearance [3] ❑ Clean appearance

O22 Cleanliness of face

[1] ❑ Visible dirt [2] ❑ Unclean appearance [3] ❑ Clean appearance

O23 Cleanliness of clothing

[1] ❑ Visible dirt [2] ❑ Unclean appearance [3] ❑ Clean appearance

Thank you very much for taking the time to talk with us! We finished the interview.

G39 Interview end time: .....

Water and Hygiene Practices in India

Yatra on-site evaluation – Post

G51 Number of respondents not wanting to be interviewed again after their visit: .....

G02 Date of the interview (DD.MM.YYYY): .....

G03 Name of the interviewer: .....

G04 Number of the interviewer: .....

G05 Interview start time: .....

G44 Yatra station: .....

G54 Code from Pre-Questionnaire: .....

General information

G06 Name of the interviewee: .....

G22 Gender: [1] ❑ Male [2] ❑ Female

G23 Age: ..... [99] ❑ I don't know

"Nirmal Bharat Yatra"

C09 How much did you like or dislike the "Nirmal Bharat Yatra"?

Rather disliked it			Rather neutral			Rather liked it		
[1] ❑	[2] ❑	[3] ❑	[4] ❑	[5] ❑	[6] ❑	[7] ❑	[8] ❑	[9] ❑
Disliked it very much	Disliked it	Quite disliked it	Slightly disliked it	Neither disliked nor liked it	Slightly liked it	Quite liked it	Liked it	Liked it very much

C10 Would you recommend visiting the "Nirmal Bharat Yatra" to your family or friends?

[1] ❑ Yes [2] ❑ No [99] ❑ I don't know

C08 How much time have you spent at the "Nirmal Bharat Yatra" today? ..... hours

Official use:

Checked: ❑ Yes Initials: _____ **Data entered:** ❑ Yes Initials: _____

G01 Questionnaire ID number (official use): .....

	"Nirmal Bharat Yatra" activities
C12	Did you play or have a look at the "Poo hoops" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C13	Did you play the "Push out the germs (marbles)" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C14	Did you play the "Velcro Poo in the loo" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C15	Did you play the "Clean hands challenge" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C16	Did you play the "Germ attack" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C17	Did you play the "Germ pyramid" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C18	Did you play the "Roll to the finish" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C19	Did you play the "Complete the picture" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C20	Did you play the "Tic Tac Toe" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C21	Did you play the "Cricket Wheel of Fortune" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C22	Did you play the "Kinect handwashing" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C23	Did you play the "Kinect catch the soap" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C24	Did you play the "Cricket poo in the loo" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C25	Did you play the "Bowl out diarrhoea" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C26	Did you play the "World Toilet Cup Cricket game" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C27	Did you play the "World Toilet cup Football game" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C28	Did you play the "Poo Minefield" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C29	Did you play the "Musical Toilets" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C30	Did you play the "Ludo" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C31	Did you play the "Poo Pairs" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C32	Did you play the "Snakes & Ladders" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C33	Did you play the "Carrom" game? 1 ❑ I played 2 ❑ I only had a look at the game 3 ❑ I neither played nor had a look at the game 99 ❑ I don't remember
C34	Did you watch a song competition? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C35	Did you watch a dance competition? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember

C36	Did you watch a Quiz show? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C37	Did you watch a film about hygiene? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C38	Did you participate in the toilet lab? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C39	Did you participate in the soap lab? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C40	Did you participate in the menstrual hygiene lab? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C41	Did you see any exhibitions? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C42	If YES to C41: Which exhibition? .....
C43	If YES to C41: Any other exhibition? .....
C44	If YES to C41: Any other exhibition? .....
C45	Did you participate in any other activity? 1 ❑ Yes 2 ❑ No 99 ❑ I don't remember
C46	If YES to C45: Which activity? ..... 1 ❑ I played 2 ❑ I only had a look
C47	If YES to C45: Which activity? ..... 1 ❑ I played 2 ❑ I only had a look
C48	If YES to C45: Which activity? ..... 1 ❑ I played 2 ❑ I only had a look
C49	If YES to C45: Which activity? ..... 1 ❑ I played 2 ❑ I only had a look
C50	If YES to C45: Which activity? ..... 1 ❑ I played 2 ❑ I only had a look

C62 IF THE RESPONDENT DIDN'T **PLAY** ANY GAMES: Why didn't you play any game?

1 ❑ Games are only for children 2 ❑ Too many people / queue too long 3 ❑ Stalls were closed
4 ❑ Not interested 5 ❑ Not enough time 99 ❑ I don't know
88 ❑ Other: .....

C63 Which three activities did you like best?

1 Activity: .....

Did you receive any information on handwashing or open defecation?

1 ❑ Yes 2 ❑ No 99 ❑ I don't know

What information did you get?

.....

2 Activity: .....

Did you receive any information on handwashing or open defecation?

[1] ❑ Yes [2] ❑ No [99] ❑ I don't know

What information did you get?

.....

3 Activity: .....

Did you receive any information on handwashing or open defecation?

[1] ❑ Yes [2] ❑ No [99] ❑ I don't know

What information did you get?

.....

C64 Did you get any new information on handwashing or open defecation at the "Nirmal Bharat Yatra" mela?

[1] ❑ Yes: .....

.....

[2] ❑ No [99] ❑ I don't know

C65 If YES to C64: Are you going to make any changes in your everyday life because of this new information? Do you want to apply this information in your everyday life?

[1] ❑ Yes: How? .....

.....

[2] ❑ No [99] ❑ I don't know

Attitude towards handwashing

I am now going to ask you a few questions about health issues

F08x OPEN QUESTION: Can you tell me what causes diarrhea?

MORE THAN ONE ANSWER POSSIBLE.

[1] ❑ Contaminated food / Diarrhea germs in food
[2] ❑ Eat hot / spicy food
[3] ❑ Contaminated water / Diarrhea germs in water
[4] ❑ Indigestion of milk / dairy products
[5] ❑ Lack of water
[6] ❑ teething
[7] ❑ Diarrhea germs
[8] ❑ Not washing hands with soap/ash/sand
[9] ❑ Germs
[10] ❑ Not washing hands after contact with feces
[11] ❑ Germs in food or water
[12] ❑ Not washing hands
[13] ❑ Drink untreated water
[14] ❑ Bad hygiene
[15] ❑ Not washing hands before eating / eat with dirty hands
[16] ❑ Defecate anywhere/not using latrine/not bury the feces
[17] ❑ Not washing hands before preparing food
[18] ❑ Hot weather
[19] ❑ Eat outside food / junk food
[20] ❑ Season change
[21] ❑ Overeating
[22] ❑ Open defecation
[23] ❑ Flies
[99] ❑ I don't know
[88] ❑ Other: .....

F10 OPEN QUESTION: Can you tell me how you can prevent getting diarrhea?
MORE THAN ONE ANSWER POSSIBLE.

- [1] ❑ Treating water / Chlorinate water
- [2] ❑ Good household hygiene / good hygiene
- [3] ❑ Boil food long enough
- [4] ❑ Wash hands often with soap/ash/sand
- [5] ❑ Wash hands with soap/ash/sand before eating
- [6] ❑ Wash raw food with safe water
- [7] ❑ Wash hands with soap/ash/sand before preparing food
- [8] ❑ Cover the food (from flies)
- [9] ❑ Wash hands with soap/ash/sand before feeding a child
- [10] ❑ Wash hands with soap/ash/sand after defecation
- [11] ❑ Wash hands with soap/ash/sand before breastfeeding a child
- [12] ❑ Wash hands with soap/ash/sand after wiping a child's bottom
- [13] ❑ Clean food preparation areas and kitchenware
- [14] ❑ Burying feces / using latrines for defecation
- [15] ❑ Cover latrines
- [99] ❑ I don't know
- [88] ❑ Other: .....

F01 How high do you feel is the risk that you get diarrhea?

[1] ❑ No risk [2] ❑ Little risk [3] ❑ Quite a risk [4] ❑ A risk [5] ❑ High risk

F04y Imagine you contracted diarrhea, how severe would be the impact on your life in general?

[1] ❑ Not severe at all [2] ❑ A little severe [3] ❑ Quite severe [4] ❑ Severe [5] ❑ Very severe

I am now going to ask you some questions about handwashing

F20 How much do you like or dislike washing hands with soap and water?

Rather dislike it			Rather neutral			Rather like it		
[1] ❑	[2] ❑	[3] ❑	[4] ❑	[5] ❑	[6] ❑	[7] ❑	[8] ❑	[9] ❑
Dislike it very much	Dislike it	Quite dislike it	Slightly dislike it	Neither dislike nor like it	Slightly like it	Quite like it	Like it	Like it very much

F17 Do you feel more attractive when you wash your hands with soap and water?

[1] ❑ Not at all more attractive [2] ❑ A little more attractive [3] ❑ Quite more attractive [4] ❑ More attractive [5] ❑ Very much more attractive

F11 Do you think that washing hands with soap and water is expensive?

[1] ❑ Not expensive [2] ❑ A little expensive [3] ❑ Quite expensive [4] ❑ Expensive [5] ❑ Very expensive

F13 Do you think that washing hands with soap and water takes a lot of effort?

[1] ❑ Takes no effort [2] ❑ Takes little effort [3] ❑ Takes quite effort [4] ❑ Takes effort [5] ❑ Takes much effort

F46 How strongly do you try to wash hands with soap and water?

[1] ❑ Not at all [2] ❑ Little [3] ❑ Some [4] ❑ Much [5] ❑ Very much

F40 How confident are you that you can wash hands with soap and water even if urgent tasks arise which interfere with handwashing?

[1] ❑ Not confident [2] ❑ A little confident [3] ❑ Quite confident [4] ❑ Confident [5] ❑ Very confident

F42 Imagine you have stopped washing hands with soap and water for several days, for example because there was no water for handwashing. How confident are you to start washing hands again?

[1] ❑ Not confident [2] ❑ A little confident [3] ❑ Quite confident [4] ❑ Confident [5] ❑ Very confident

F48 What do you do when you want to wash your hands and there is no soap for handwashing?

[1] ❑ Don't use soap [2] ❑ Alternative: .....

F24y Do you feel dirty if you don't wash your hands with soap and water after using the toilet?

[1] ❑ Don't feel dirty [2] ❑ Feel a little dirty [3] ❑ Feel quite dirty [4] ❑ Feel dirty [5] ❑ Feel very dirty

F64y How important is it for you to wash hands with soap and water after using the toilet?

[1] ❑ Not important [2] ❑ A little important [3] ❑ Quite important [4] ❑ Important [5] ❑ Very important

F66y Do you feel committed to wash hands with soap and water after using the toilet?

1 ❑ Not committed 2 ❑ A little committed 3 ❑ Quite committed 4 ❑ Committed 5 ❑ Very committed

F30y Do you feel a personal obligation to wash hands with soap and water after using the toilet?

1 ❑ No personal obligation 2 ❑ Weak personal obligation 3 ❑ Medium personal obligation 4 ❑ Strong personal obligation 5 ❑ Very strong personal obligation

F33y Do you think you are able to always wash hands with soap and water after using the toilet?

1 ❑ Not able 2 ❑ A little able 3 ❑ Quite able 4 ❑ Able 5 ❑ Very able

F59y How much do you feel that you wash your hands with soap and water after using the toilet as a matter of habit?

1 ❑ Not a habit 2 ❑ A weak habit 3 ❑ Quite a strong habit 4 ❑ A strong habit 5 ❑ A very strong habit

F38y How difficult is it to find the time to wash hands with soap and water after using the toilet?

1 ❑ Not difficult 2 ❑ A little difficult 3 ❑ Quite difficult 4 ❑ Difficult 5 ❑ Very difficult

F53y How strongly do you intend to always wash hands with soap and water after using the toilet?

1 ❑ Not at all strongly 2 ❑ A little strongly 3 ❑ Quite strongly 4 ❑ Strongly 5 ❑ Very strongly

F29y People who are important to you, do they rather think you should or you should not wash your hands with soap and water after using the toilet?

Rather should not			Rather neutral			Rather should		
1 ❑	2 ❑	3 ❑	4 ❑	5 ❑	6 ❑	7 ❑	8 ❑	9 ❑
Nearly all think I should no	Most think I should not	Quite more than half think I should not	Slightly more than half think I should not	The same amount think I should not and I should	Slightly more than half think I should	Quite more than half think I should	Most think I should	Nearly all think I should

99 ❑ I don't know

F16y How certain are you that washing hands with soap and water after using the toilet prevents you and your family from getting diarrhea?

1 ❑ Not certain 2 ❑ A little certain 3 ❑ Quite certain 4 ❑ Certain 5 ❑ Very certain

Thank you very much for taking the time to talk with us! We finished the interview.

G39 Interview end time: .....

Appendix II: Supplementary Material Chapter III

Questionnaire used in Burundi to assess caregivers' handwashing attitudes and practices (French version)

Please note: Data were collected in electronic form using Open Data Kit software on a tablet device.

Questionnaire pour les adultes			
	Question		**Options de réponse**
Informations sur l'enquête			
bAI001	Ménage du jour	1	1er ménage (avec observation)
		2	2e ménage (sans observation)
bAI002	Nom de l'enquêteur		
bAI003	Commune		
bAI004	École primaire		
bAI005	Colline		
bAI006	Sous-colline		
bAI007	Date		
Informations sur la participante			
bAI101	Quel est votre nom et prénom?		
bAI102	Sexe	1	Masculin
		2	Féminin
bAI103	Quel âge avez-vous		
bAI104	Quel est votre statut matrimonial?	1	Marié
		2	Célibataire
		3	Veuf
		4	Divorcé/Séparé
bAI105	Quel est le nom et prénom du chef du ménage?		
bAI106	Quel est votre lien de parenté avec le chef de ménage?	1	Époux/épouse
		2	fille
		3	mère
		4	sœur
		5	Lui-même
		88	Autre
bAI107	Quel est votre lien de parenté avec l'enfant indice?	1	Mère
		2	Sœur
		3	Grand-mère
		4	Tante
		88	Autre
bAI108	Savez-vous lire et écrire?	1	Ni lire ni écrire
		2	Lire uniquement
		3	Aussi bien lire qu'écrire
bAI109	Combien d'années êtes-vous allées à l'école?		

bAI110	Quel est le plus haut niveau d'études que avez-vous terminé (avec certificat)?	1	Primaire (1re à 6e année)
		2	Secondaire 1er cycle (7e à 10e année)
		3	Secondaire 2e cycle (11e à 13e année)
		4	Supérieur
		5	Catecumena (formation informelle)
		6	Aucun niveau terminé (aucun certificat)
		88	Autre
bAI111	Quelle est votre affiliation religieuse?	1	Catholique
		2	Protestante
		3	Musulmane
		4	Aucune affiliation religieuse
		88	Autre

Rappel imaginaire caché

bAB001	Imaginez que vous êtes en train de cuisiner et que vous sentez le besoin de vous moucher. S'il vous plaît, décrivez avec le plus de détails possibles ce que vous faites après avoir mouché jusqu'à continuer de cuisiner.	1	Le lavage des mains n'a pas été mentionné
		2	Le lavage des mains AVEC DE L'EAU a été mentionné
		3	Le lavage des mains avec de l'eau et du SAVON a été mentionné
bAB002	Imaginez que vous sortez des lieux d'aisance et que votre enfant a faim et que vous devez le nourrir. S'il vous plaît, décrivez avec le plus de détails possibles ce que vous faites après avoir utilisé les lieux d'aisance jusqu'à nourrir votre enfant.	1	Le lavage des mains n'a pas été mentionné
		2	Le lavage des mains AVEC DE L'EAU a été mentionné
		3	Le lavage des mains avec de l'eau et du SAVON a été mentionné
bAB003	Imaginez que vous revenez du travail aux champs et que vous devez commencer à cuisiner. S'il vous plaît, décrivez avec le plus de détails possibles ce que vous faites après être retourné du travail aux champs jusqu'à commencer de cuisiner.	1	Le lavage des mains n'a pas été mentionné
		2	Le lavage des mains AVEC DE L'EAU a été mentionné
		3	Le lavage des mains avec de l'eau et du SAVON a été mentionné
bAB004	Imaginez que vous venez de faire la propreté du bébé après défécation et que vous voulez l'allaiter. S'il vous plaît, décrivez avec le plus de détails possibles ce que vous faites après avoir fait la propreté du bébé après défécation jusqu'à ce que vous l'allaitez.	1	Le lavage des mains n'a pas été mentionné
		2	Le lavage des mains AVEC DE L'EAU a été mentionné
		3	Le lavage des mains avec de l'eau et du SAVON a été mentionné
		4	L'enquêté était un homme / En ce moment, l'enquêtée n'allaite pas

Le lavage des mains

Je vais maintenant vous poser des questions sur le lavage des mains.

bAD124	Question à réponse ouverte: Quels sont les effets du lavage des mains avec de l'eau et du savon?	1	Prévention des maladies liées à l'eau
		2	Prévention des maladies respiratoires
		3	Protection de la santé des enfants
		77	Croyance erronée
		99	Je ne sais pas

bAD402	Question à réponse ouverte: Quels sont les moments critiques pour le lavage des mains au savon?	1	Après avoir déféqué (après l'utilisation des toilettes)
		2	Après avoir nettoyé le derrière d'un enfant
		3	Après d'autres types de contact avec les selles
		4	Avant d'allaiter un enfant
		5	Avant de nourrir un enfant
		6	Avant de préparer la nourriture
		7	Avant de manipuler l'eau potable
		8	Avant de manger
		99	Je ne sais pas
bAD401	Question à réponse ouverte: Quelles sont les différentes étapes pour bien vous laver les mains?	1	Se mouiller les mains avec de l'eau
		2	Mettre du savon
		3	Frotter la paume de la main
		4	Frotter entre les doigts
		5	Frotter sous les ongles
		6	Frotter les poignets
		7	Frotter le dos de la main
		8	Rincer les mains sous l'eau courante
		9	Sécher les mains avec une serviette propre
		10	Sécher les mains à l'air
		99	Je ne sais pas
bAB103	Question à réponse ouverte: Dans quelles situations est-ce que vous vous lavez les mains avec de l'eau uniquement?	1	Après avoir déféqué (après l'utilisation des toilettes)
		2	Après avoir nettoyé le derrière d'un enfant
		3	Après d'autres types de contact avec les selles
		4	Avant d'allaiter un enfant
		5	Avant de nourrir un enfant
		6	Avant de préparer la nourriture
		7	Avant de manipuler l'eau potable
		8	Avant de manger
		88	Autre
		0	Jamais
bAB104	Pourquoi est-ce que vous vous lavez les mains avec de l'eau uniquement dans ces situations?		
bAB105	Question à réponse ouverte: Dans quelles situations est-ce que vous vous lavez les mains avec de l'eau et du savon?	1	Après avoir déféqué (après l'utilisation des toilettes)
		2	Après avoir nettoyé le derrière d'un enfant
		3	Après d'autres types de contact avec les selles
		4	Avant d'allaiter un enfant
		5	Avant de nourrir un enfant
		6	Avant de préparer la nourriture
		7	Avant de manipuler l'eau potable
		8	Avant de manger
		88	Autre
bAB106	Pourquoi est-ce que vous vous lavez les mains avec de l'eau et du savon dans ces situations?		

L'état de santé

Je vais maintenant vous poser quelques questions au sujet de l'état de santé.

bAD122	Question à réponse ouverte: Pouvez-vous me dire quels sont les signes de la diarrhée?	1	Selles liquides, aqueuses
		2	Perte d'eau et de sels minéraux, déshydratation
		3	Perte de poids, poids insuffisant
		4	Faiblesse, fièvre, maux d'estomac, nausée
		99	Je ne sais pas
		77	Croyance erronée

La diarrhée est l'émission d'au moins trois selles molles ou liquides par jour, ou à une fréquence anormale pour l'individu. Des émissions fréquentes de selles bien moulées ne sont pas une diarrhée.

bAD121	Question à réponse ouverte: Pouvez-vous me dire quelles sont les causes de la diarrhée?	1	Ne pas se laver les mains avec de l'eau et du savon avant de toucher à la nourriture
		2	Ne pas se laver les mains avec de l'eau et du savon après contact avec les selles
		3	Consommer des aliments contaminés ou pourris
		4	Consommer de l'eau contaminée
		99	Je ne sais pas
		77	Croyance erronée
bAD123	Question à réponse ouverte: Qu'est-ce que vous pouvez faire pour ne pas contracter la diarrhée?	1	Se laver les mains avec de l'eau et du savon avant de toucher à la nourriture
		2	Se laver les mains avec de l'eau et du savon après contact avec les selles
		3	Ne pas manger des aliments pourris, contaminés / cuire, couvrir, peler, laver les aliments
		4	Ne pas boire de l'eau contaminée / bouillir, traiter l'eau potable
		5	Utiliser des latrines / couvrir les latrines
		99	Je ne sais pas
		77	Croyance erronée
bAD111	Imaginez que vous avez contracté la diarrhée, quelle serait la gravité de l'impact sur votre vie quotidienne?	1	Pas grave du tout
		2	Un peu grave
		3	Modérément grave
		4	Très grave
		5	Énormément grave
bAB301	Est-ce que vous avez eu la diarrhée au cours de la semaine passée?	1	Oui
		2	Non
		3	Je ne sais pas
bAB302	Est-ce que l'enfant indice, a-t-il eu la diarrhée au cours de la semaine passée?	1	Oui
		2	Non
		3	Je ne sais pas
bAB303	Si oui: L'enfant s'est-il absenté de l'école à cause de la diarrhée au cours de la semaine passée?	1	Oui
		2	Non
		3	Je ne sais pas
bAB304	Combien d'enfants de moins de cinq ans sont tombés malade de la diarrhée au cours de la semaine passée?		
bAB305	Combien d'enfants entre cinq et douze ans sont tombés malade de la diarrhée au cours de la semaine passée?		

Les pratiques du lavage des mains

	Je vais maintenant vous poser encore des questions sur le lavage des mains.		
bAB101	Qu'utilisez-vous habituellement pour vous laver les mains?	1	De l'eau uniquement
		2	De l'eau et du savon
		88	Autre
bAB102	Quand vous utilisez du savon pour le lavage des mains, quel type utilisez-vous?	1	Habituellement pas de savon
		2	Savon solide
		3	Savon en poudre
		4	Savon liquide
		88	Autre
bAE102	Avez-vous du savon destiné pour le lavage des mains uniquement?	1	Oui
		2	Non
bAE101	Avez-vous du savon à la maison?	1	Oui
		2	Non
		99	Je ne sais pas
bAE103	Combien coûte un pain de savon?		BIF
bAE104	À combien s'élèvent les dépenses mensuelles du ménage en savon pour le lavage des mains?		BIF
bAB108	Quel dispositif utilisez-vous normalement pour dispenser l'eau pour le lavage des mains?	1	Robinet/clapet comme source d'eau courante pour rincer les mains
		2	Gobelet/tasse/bol/louche pour verser l'eau sur les mains
		3	Bassine/cuvette/seau pour tremper les mains
		88	Autre
bAB107	Comment est-ce que vous vous séchez les mains?	1	Sécher les mains avec une serviette propre
		2	Sécher les mains à l'air
		3	Sécher les mains avec les vêtements
		88	Autre
bAB109	Est-ce que vous avez un endroit spécifique pour le lavage des mains après utilisation de la latrine?	1	Oui
		2	Non
bAB110	Est-ce que vous avez un endroit différent mais spécifique pour le lavage des mains avant de manger?	1	Oui
		2	Non
bAE001	D'où provient principalement l'eau pour le lavage des mains?	1	Branchement privé
		2	Borne fontaine
		3	Puits protégé
		4	Source aménagée
		5	Source non-aménagée
		6	Puits non-protégé
		7	Système de collecte des eaux pluviales
		8	Vendeur privé
		9	Eau de surface
		99	Je na sais pas
		88	Autre

Le lavage des mains: Obstacles et planification

bAD503	Est-ce que vous planifiez une quantité d'eau pour le lavage des mains vous devez aller chercher pour vous laver les mains avec de l'eau et du savon?	1	Oui
		2	Non
bAD504	Est-ce que vous planifiez le nombre de savon pour le lavage des mains vous devez acheter pour vous laver les mains avec de l'eau et du savon?	1	Oui
		2	Non

bAD505	Est-ce que vous planifiez où aller chercher de l'eau pour vous laver les mains avec de l'eau et du savon?	1	Oui
		2	Non
bAD506	Est-ce que vous planifiez où acheter du savon pour vous laver les mains avec de l'eau et du savon?	1	Oui
		2	Non
bAD541	Combien de fois est-ce que ça arrive que vous voulez vous laver les mains avec de l'eau et du savon mais il n'y a pas d'eau?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAD531	Quel est votre plan pour faire en sorte que vous pouvez toujours vous laver les mains avec de l'eau et du savon s'il n'y a pas d'eau?	1	Le plan est:
		2	Pas de plan
bAD542	Combien de fois est-ce que ça arrive que vous voulez vous laver les mains avec de l'eau et du savon mais il n'y a pas de savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAD532	Quel est votre plan pour faire en sorte que vous pouvez toujours vous laver les mains avec de l'eau et du savon s'il n'y a pas de savon?	1	Le plan est:
		2	Pas de plan
bAD543	Combien de fois est-ce que ça arrive que vous voulez vous laver les mains avec de l'eau et du savon mais il n'y a pas assez d'argent pour acheter du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAD533	Quel est votre plan pour faire en sorte que vous pouvez toujours vous laver les mains avec de l'eau et du savon s'il n'y a pas d'argent pour acheter du savon?	1	Le plan est:
		2	Pas de plan
Le lavage des mains: Attitudes			
bAD221	À quel point est-ce que vous aimez toujours vous laver les mains avec de l'eau et du savon?	1	J'aime pas du tout
		2	J'aime un peu
		3	J'aime modérément
		4	J'aime beaucoup
		5	J'aime énormément
bAD223	À quel point est-ce que vous aimez l'odeur de vos mains après les avoir lavées avec de l'eau et du savon?	1	J'aime pas du tout l'odeur
		2	J'aime un peu l'odeur
		3	J'aime modérément l'odeur
		4	J'aime beaucoup l'odeur
		5	J'aime énormément l'odeur
bAD222	À quel point est-ce que vous trouvez que c'est agréable de toujours vous laver les mains avec de l'eau et du savon?	1	Pas du tout agréable
		2	Un peu agréable
		3	Modérément agréable
		4	Très agréable
		5	Énormément agréable
bAB201	Durant les dernières 24 heures, est-ce que vous vous êtes lavé les mains avec de l'eau et du savon?	1	Oui
		2	Non

bAB202	Question à réponse ouverte: Dans quelle(s) situation(s)?	1	Après avoir déféqué (après l'utilisation des toilettes)
		2	Après avoir nettoyé le derrière d'un enfant
		3	Après d'autres types de contact avec les selles
		4	Avant d'allaiter un enfant
		5	Avant de nourrir un enfant
		6	Avant de préparer la nourriture
		7	Avant de manipuler l'eau potable
		8	Avant de manger
		88	Autre
bAD501	Est-ce qu'il y a des situations dans lesquelles vous planifiez toujours vous laver les mains avec de l'eau et du savon?	1	Oui
		2	Non
bAD502	Question à réponse ouverte: Si oui, lesquelles?	1	Après avoir déféqué (après l'utilisation des toilettes)
		2	Après avoir nettoyé le derrière d'un enfant
		3	Après d'autres types de contact avec les selles
		4	Avant d'allaiter un enfant
		5	Avant de nourrir un enfant
		6	Avant de préparer la nourriture
		7	Avant de manipuler l'eau potable
		8	Avant de manger
		88	Autre
Le lavage des mains: Pratiques et habitudes			
bAB203	Pensez à la dernière fois où vous avez mangé. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon avant de manger?	1	Oui
		2	Non
		3	Je ne me souviens pas
bAB204	Pensez à la dernière fois où vous avez allaité un enfant. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon avant d'allaiter l'enfant?	1	Oui
		2	Non
		3	Je ne me souviens pas
		4	L'enquêté était un homme / En ce moment, l'enquêtée n'allaite pas
bAB205	Pensez à la dernière fois où vous avez nourri un enfant. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon avant de nourrir l'enfant?	1	Oui
		2	Non
		3	Je ne me souviens pas
bAB206	Pensez à la dernière fois où vous avez préparé de la nourriture. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon avant de préparer la nourriture?	1	Oui
		2	Non
		3	Je ne me souviens pas
bAB207	Pensez à la dernière fois où vous avez manipulé de l'eau potable. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon avant de manipuler l'eau potable?	1	Oui
		2	Non
		3	Je ne me souviens pas
bAB208	Pensez à la dernière fois où vous avez nettoyé le derrière d'un enfant. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon après avoir nettoyé le derrière de l'enfant?	1	Oui
		2	Non
		3	Je ne me souviens pas
bAB209	Pensez à la dernière fois où vous avez déféqué. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon après avoir déféqué?	1	Oui
		2	Non
		3	Je ne me souviens pas

bAB210	Pensez à la dernière fois où vous eu d'autres types de contact avec des selles. Est-ce que vous vous êtes lavé les mains avec de l'eau et du savon après ce contact avec les selles?	1	Oui
		2	Non
		3	Je ne me souviens pas
bAB211	Avant de manger, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB212	Avant d'allaiter un enfant, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
		6	L'enquêté était un homme / En ce moment, l'enquêtée n'allaite pas
bAB213	Avant de nourrir un enfant, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB214	Avant de préparer de la nourriture, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB215	Avant de manipuler de l'eau potable, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB216	Après avoir déféqué, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB217	Après avoir nettoyé le derrière d'un enfant, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB218	Après d'autres types de contact avec les selles, combien de fois vous lavez-vous les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB219	Apprenez-vous à vos enfants à se laver les mains avec de l'eau et du savon?	1	Oui
		2	Non
		88	Autre

bAB220	Combien de fois vous rappelez à vos enfants de se laver les mains avec de l'eau et du savon?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAB221	Si oui, combien trouvez-vous que c'est difficile d'apprendre à vos enfants à se laver les mains avec de l'eau et du savon?	1	Pas difficile du tout
		2	Un peu difficile
		3	Modérément difficile
		4	Très difficile
		5	Énormément difficile
bAB222	Qu'est-ce qui rend difficile de leur apprendre à se laver les mains avec de l'eau et du savon?	1	Manque de contrôle
		2	Manque de connaissance
		3	Ils l'oublient
		4	Ils ont besoin d'appui
		5	J'oublie de leur dire
		6	Ils sont têtus
		7	Manque de temps
		88	Autre

Le lavage des mains avant de toucher à la nourriture

Je vais maintenant vous poser quelques questions sur le lavage des mains avant de toucher à la nourriture. Cela comprend le lavage des mains avant de manger, avant de préparer la nourriture, avant de nourrir un enfant, avant d'allaiter un enfant et avant de manipuler de l'eau potable.

Avant de toucher à la nourriture: Intention et habitudes

bAD004f	À quel point avez-vous l'intention de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément
bAD003f	A quel point jugez-vous que vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture est une habitude chez vous?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément
bAD002f	Vous lavez-vous les mains avec de l'eau et du savon avant de toucher à la nourriture sans réfléchir?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément
bAD001f	Dans quelle mesure devez-vous réfléchir avant de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément

Avant de toucher à la nourriture: Risque et vulnérabilité

bAD101f	En tenant compte de vos pratiques de lavage des mains avant de toucher à la nourriture, quelle est l'ampleur de risque de tomber malade de diarrhée?	1	Pas de risque du tout
		2	Risque peu élevé
		3	Risque modérément élevé
		4	Risque très élevé
		5	Risque énormément élevé

bAD102f	Selon vous, quelle est l'ampleur de risque de tomber malade de diarrhée si vous vous lavez toujours les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de risque du tout
		2 Risque peu élevé
		3 Risque modérément élevé
		4 Risque très élevé
		5 Risque énormément élevé
bAD103f	Selon vous, quelle est l'ampleur de risque de tomber malade de diarrhée si vous ne vous lavez jamais les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de risque du tout
		2 Risque peu élevé
		3 Risque modérément élevé
		4 Risque très élevé
		5 Risque énormément élevé
Avant de toucher à la nourriture: Attitudes et croyances		
bAD207f	À quel point êtes-vous certaines que toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture vous empêche de tomber malade de diarrhée?	1 Pas certaine du tout
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD208f	À quel point pensez-vous que se laver les mains avec de l'eau et du savon avant de toucher à la nourriture protège vos enfants d'attraper la diarrhée?	1 Pas important du tout
		2 Un peu important
		3 Modérément important
		4 Très important
		5 Énormément important
bAD201f	Selon vous, combien est-ce que c'est cher de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas cher du tout
		2 Un peu cher
		3 Modérément cher
		4 Très cher
		5 Énormément cher
bAD202f	Selon vous, combien de temps est-ce que ça demande de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de temps du tout
		2 Un peu de temps
		3 Modérément de temps
		4 Beaucoup de temps
		5 Énormément de temps
bAD203f	Selon vous, combien d'effort est-ce que ça demande de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas d'effort du tout
		2 Un peu d'effort
		3 Modérément d'effort
		4 Beaucoup d'effort
		5 Énormément d'effort
bAD204f	Selon vous, combien est-ce que c'est pénible de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas pénible du tout
		2 Un peu pénible
		3 Modérément pénible
		4 Très pénible
		5 Énormément pénible

bAD205f	Selon vous, combien est-ce que c'est exigeant de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas exigeant du tout
		2 Un peu exigeant
		3 Modérément exigeant
		4 Très exigeant
		5 Énormément exigeant
bAD206f	Selon vous, combien est-ce que c'est énervant de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas énervant du tout
		2 Un peu énervant
		3 Modérément énervant
		4 Très énervant
		5 Énormément énervant
bAD210f	Tenant compte des avantages du lavage des mains ainsi que des efforts à investir, combien est-ce que ça en vaut la peine de toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD209f	À quel point est-ce que vous vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture pour donner un bon exemple aux enfants?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD211f	À quel point est-ce que vous vous sentez plus attirante pour votre partenaire lorsque vous vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout plus attirante
		2 Un peu plus attirante
		3 Modérément plus attirante
		4 Beaucoup plus attirante
		5 Énormément plus attirante
		6 L'enquêté(e) n'a pas de partenaire
bAD224f	À quel point est-ce que vous trouvez que c'est dégoutant de ne pas toujours se laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout dégoutant
		2 Un peu dégoutant
		3 Modérément dégoutant
		4 Très dégoutant
		5 Énormément dégoutant
bAD225f	À quel point est-ce que vous sentez sale si vous ne vous lavez pas les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout sale
		2 Un peu sale
		3 Modérément sale
		4 Très sale
		5 Énormément sale
bAD226f	Dans quelle mesure est-ce que vous vous sentez fière si vous vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout fière
		2 Un peu fière
		3 Modérément fière
		4 Très fière
		5 Énormément fière

Avant de toucher à la nourriture: Normes sociales		
bAD301f	Combien de personnes dans votre ménage se lavent toujours les mains avec de l'eau et du savon avant de toucher à la nourriture chez vous?	1 (Presque) personne (0%)
		2 Certains d'entre eux (25%)
		3 La moitié d'entre eux (50%)
		4 La plupart d'entre eux (75%)
		5 (Presque) tous (100%)
bAD302f	À votre avis, combien de personnes dans votre communauté se lavent toujours les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 (Presque) personne (0%)
		2 Certains d'entre eux (25%)
		3 La moitié d'entre eux (50%)
		4 La plupart d'entre eux (75%)
		5 (Presque) tous (100%)
		6 Ce n'est pas ma préoccupation
bAD311f	Les personnes qui sont importantes pour vous, combien est-ce qu'elles pensent que vous devez toujours vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD312f	Les personnes qui sont importantes pour vous, combien est-ce qu'elles pensent que vous ne devez pas vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
Avant de toucher à la nourriture: Aptitudes et capacités		
bAD411f	À quel point est-il difficile de toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas difficile du tout
		2 Un peu difficile
		3 Modérément difficile
		4 Très difficile
		5 Énormément difficile
bAD412f	À quel point êtes-vous certaine que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD413f	À quel point êtes-vous certaine que vous pouvez trouver le temps pour toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD414f	À quel point êtes-vous certaine que vous pouvez disposer d'eau en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine

bAD415f	À quel point êtes-vous certaine que vous pouvez disposer de savon en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD416f	À quel point êtes-vous certaine que vous pouvez vous rappeler de toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD421f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, même si ça prend beaucoup de temps pour que ça devienne une habitude?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD422f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, même si ça prend beaucoup de temps pour disposer d'eau en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD423f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, même si ça prend plus de temps que d'habitude pour disposer d'eau en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD424f	Imaginez-vous que vous êtes pressée, par exemple parce que vous avez faim et que vous voulez commencer à cuisiner: À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD425f	Imaginez-vous que votre enfant est en train de pleurer: À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD426f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, même s'il n'y a pas d'impact visible?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance

bAD427f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, s'il y avait un endroit fixe pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD428f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, même si vous devez dépenser beaucoup d'argent pour disposer de savon en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD429f	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, même si vous avez moins d'argent à disposition pour disposer de savon en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD441f	Imaginez-vous que vous avez arrêté de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture pour quelques jours, par exemple parce qu'il n'y avait pas d'eau ou pas de savon à disposition. À quel point avez-vous confiance que vous allez recommencer de toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
Avant de toucher à la nourriture: Planification et oubli		
bAD507f	Est-ce que vous planifiez un dispositif pour vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Oui
		2 Non
bAD508f	Est-ce que vous planifiez toujours vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture dans un endroit spécifique?	1 Oui
		2 Non
bAD509f	Est-ce que vous planifiez où vous gardez le savon pour vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Oui
		2 Non
bAD521f	À quel point faites-vous attention à vous rappeler de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD522f	À quel point faites-vous attention pour disposer d'eau en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément

bAD523f	À quel point faites-vous attention pour disposer de savon en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD524f	À quel point faites-vous attention pour trouver le temps pour toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD525f	À quel point êtes-vous consciente de votre but de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout consciente
		2 Un peu consciente
		3 Modérément consciente
		4 Beaucoup consciente
		5 Énormément consciente
bAD561f	À quel point de fois vous souvenez-vous de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 (presque) jamais
		2 Rarement
		3 Quelquefois
		4 Souvent
		5 (presque) toujours
bAD562f	Lorsque vous pensez aux dernières 24 heures: combien de fois vous est-il arrivé d'oublier de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture alors que vous en aviez l'intention?	1 (presque) jamais
		2 Rarement
		3 Quelquefois
		4 Souvent
		5 (presque) toujours
bAD563f	Est-ce que vous avez une astuce pour vous rappeler de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture? Si oui, laquelle?	
Avant de toucher à la nourriture: Obstacles et stratégies		
bAD544f	Combien de fois est-ce que ça arrive que vous êtes tellement pressée que vous ne trouvez pas le temps pour vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 (Presque) jamais 0-1 fois sur 10
		2 Certaines fois/ 2-3 fois sur 10
		3 La moitié du temps/ 4-6 fois sur 10
		4 La plupart du temps / 7-8 fois sur 10
		5 (Presque) à chaque fois / 9-10 fois sur 10
bAD534f	Quel est votre plan pour faire en sorte que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture quand vous êtes pressée?	1 Le plan est:
		2 Pas de plan
bAD545f	Combien de fois est-ce que ça arrive que vous oubliez de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 (Presque) jamais / 0-1 fois sur 10
		2 Certaines fois/ 2-3 fois sur 10
		3 La moitié du temps/ 4-6 fois sur 10
		4 La plupart du temps / 7-8 fois sur 10
		5 (Presque) à chaque fois / 9-10 fois sur 10
bAD535f	Quel est votre plan pour faire en sorte de ne pas oublier de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture même si vous êtes pressée?	1 Le plan est:
		2 Pas de plan

bAD546f	Y a-t-il d'autres obstacles ou barrières au lavage des mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Oui
		2	Non
bAD547f	Si oui, veuillez préciser les obstacles:		
bAD548f	Ces obstacles, à quelle fréquence est-ce qu'ils apparaissent?	1	(Presque) jamais / 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAD536f	Quel est votre plan pour surmonter ces obstacles?	1	Le plan est:
		2	Pas de plan
Avant de toucher à la nourriture: Engagement			
bAD571f	À quel point est-ce que vous êtes engagée à vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Pas du tout engagée
		2	Un peu engagée
		3	Modérément engagée
		4	Très engagée
		5	Énormément engagée
bAD572f	À quel point est-il important pour vous de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Pas du tout important
		2	Un peu important
		3	Modérément important
		4	Très important
		5	Énormément important
bAD573f	Dans quelle mesure est-ce que vous avez une obligation envers vous-même de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture (par exemple parce que vous avez pris cette résolution)?	1	Aucune obligation
		2	Un peu d'obligation
		3	Modérément d'obligation
		4	Beaucoup d'obligation
		5	Énormément d'obligation
bAD578f	Dans quelle mesure est-ce que vous avez une obligation envers les autres de vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture (par exemple parce qu'ils connaissent votre résolution)?	1	Aucune obligation
		2	Un peu d'obligation
		3	Modérément d'obligation
		4	Beaucoup d'obligation
		5	Énormément d'obligation
bAD574f	À quel point vous sentez-vous contrainte à vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Pas du tout obligée
		2	Un peu obligée
		3	Modérément obligée
		4	Très obligée
		5	Énormément obligée
bAD575f	À quel point est-ce que vous vous fâchez si vous ne vous êtes pas lavé les mains avec de l'eau et du savon avant de toucher à la nourriture?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément
bAD576f	À quel point est-ce que vous faites des efforts pour vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, en dépit de difficultés?	1	Pas du tout d'efforts
		2	Un peu d'efforts
		3	Modérément d'efforts
		4	Beaucoup d'efforts
		5	Énormément d'efforts

bAD577f	À quel point est-ce que vous vous sentez bien si vous arriver à vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture, en dépit de difficultés?	1 Pas du tout bien 2 Un peu bien 3 Modérément bien 4 Très bien 5 Énormément bien
bAD579f	À quel point est-ce que vous êtes contente si vous arriver à vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture, en dépit de difficultés?	1 Pas du tout contente 2 Un peu contente 3 Modérément contente 4 Très contente 5 Énormément contente
bAD570f	À quel point avez-vous mauvaise conscience si vous ne vous lavez les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas du tout 2 Un peu 3 Modérément 4 Beaucoup 5 Énormément

Le lavage des mains après contact avec les selles

Je vais maintenant vous poser quelques questions sur le lavage des mains après contact avec les selles. Cela comprend le lavage des mains après avoir déféqué, après avoir nettoyé le derrière d'un enfant et après d'autres types de contact avec les selles.

Après contact avec les selles: Intention et habitudes

bAD004s	À quel point avez-vous l'intention de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout 2 Un peu 3 Modérément 4 Beaucoup 5 Énormément
bAD003s	A quel point jugez-vous que vous laver les mains avec de l'eau et du savon après contact avec les selles est une habitude chez vous?	1 Pas du tout 2 Un peu 3 Modérément 4 Beaucoup 5 Énormément
bAD002s	Vous lavez-vous les mains avec de l'eau et du savon après contact avec les selles sans réfléchir?	1 Pas du tout 2 Un peu 3 Modérément 4 Beaucoup 5 Énormément
bAD001s	Dans quelle mesure devez-vous réfléchir avant de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout 2 Un peu 3 Modérément 4 Beaucoup 5 Énormément

Après contact avec les selles: Risque et vulnérabilité

bAD101s	En tenant compte de vos pratiques de lavage des mains après contact avec les selles, quelle est l'ampleur de risque de tomber malade de diarrhée?	1 Pas de risque du tout 2 Risque peu élevé 3 Risque modérément élevé 4 Risque très élevé 5 Risque énormément élevé

bAD102s	Selon vous, quelle est l'ampleur de risque de tomber malade de diarrhée si vous vous lavez toujours les mains avec de l'eau et du savon après contact avec les selles?	1 Pas de risque du tout
		2 Risque peu élevé
		3 Risque modérément élevé
		4 Risque très élevé
		5 Risque énormément élevé
bAD103s	Selon vous, quelle est l'ampleur de risque de tomber malade de diarrhée si vous ne vous lavez jamais les mains avec de l'eau et du savon après contact avec les selles?	1 Pas de risque du tout
		2 Risque peu élevé
		3 Risque modérément élevé
		4 Risque très élevé
		5 Risque énormément élevé
Après contact avec les selles: Attitudes et croyances		
bAD207s	À quel point êtes-vous certaines que toujours se laver les mains avec de l'eau et du savon après contact avec les selles vous empêche de tomber malade de diarrhée?	1 Pas certaine du tout
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD208s	À quel point pensez-vous que se laver les mains avec de l'eau et du savon après contact avec les selles protège vos enfants d'attraper la diarrhée?	1 Pas important du tout
		2 Un peu important
		3 Modérément important
		4 Très important
		5 Énormément important
bAD201s	Selon vous, combien est-ce que c'est cher de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas cher du tout
		2 Un peu cher
		3 Modérément cher
		4 Très cher
		5 Énormément cher
bAD202s	Selon vous, combien de temps est-ce que ça demande de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas de temps du tout
		2 Un peu de temps
		3 Modérément de temps
		4 Beaucoup de temps
		5 Énormément de temps
bAD203s	Selon vous, combien d'effort est-ce que ça demande de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas d'effort du tout
		2 Un peu d'effort
		3 Modérément d'effort
		4 Beaucoup d'effort
		5 Énormément d'effort
bAD204s	Selon vous, combien est-ce que c'est pénible de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas pénible du tout
		2 Un peu pénible
		3 Modérément pénible
		4 Très pénible
		5 Énormément pénible

bAD205s	Selon vous, combien est-ce que c'est exigeant de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas exigeant du tout
		2 Un peu exigeant
		3 Modérément exigeant
		4 Très exigeant
		5 Énormément exigeant
bAD206s	Selon vous, combien est-ce que c'est énervant de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas énervant du tout
		2 Un peu énervant
		3 Modérément énervant
		4 Très énervant
		5 Énormément énervant
bAD210s	Tenant compte des avantages du lavage des mains ainsi que des efforts à investir, combien est-ce que ça en vaut la peine de toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD209s	À quel point est-ce que vous vous lavez les mains avec de l'eau et du savon après contact avec les selles pour donner un bon exemple aux enfants?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD211s	À quel point est-ce que vous vous sentez plus attirante pour votre partenaire lorsque vous vous lavez les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout plus attirante
		2 Un peu plus attirante
		3 Modérément plus attirante
		4 Beaucoup plus attirante
		5 Énormément plus attirante
		6 L'enquêté(e) n'a pas de partenaire
bAD224s	À quel point est-ce que vous trouvez que c'est dégoutant de ne pas toujours se laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout dégoutant
		2 Un peu dégoutant
		3 Modérément dégoutant
		4 Très dégoutant
		5 Énormément dégoutant
bAD225s	À quel point est-ce que vous sentez sale si vous ne vous lavez pas les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout sale
		2 Un peu sale
		3 Modérément sale
		4 Très sale
		5 Énormément sale
bAD226s	Dans quelle mesure est-ce que vous vous sentez fière si vous vous lavez les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout fière
		2 Un peu fière
		3 Modérément fière
		4 Très fière
		5 Énormément fière

Après contact avec les selles: Normes sociales		
bAD301s	Combien de personnes dans votre ménage se lavent toujours les mains avec de l'eau et du savon après contact avec les selles chez vous?	1 (Presque) personne (0%)
		2 Certains d'entre eux (25%)
		3 La moitié d'entre eux (50%)
		4 La plupart d'entre eux (75%)
		5 (Presque) tous (100%)
bAD302s	À votre avis, combien de personnes dans votre communauté se lavent toujours les mains avec de l'eau et du savon après contact avec les selles?	1 (Presque) personne (0%)
		2 Certains d'entre eux (25%)
		3 La moitié d'entre eux (50%)
		4 La plupart d'entre eux (75%)
		5 (Presque) tous (100%)
		6 Ce n'est pas ma préoccupation
bAD311s	Les personnes qui sont importantes pour vous, combien est-ce qu'elles pensent que vous devez toujours vous lavez les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD312s	Les personnes qui sont importantes pour vous, combien est-ce qu'elles pensent que vous ne devez pas vous lavez les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
Après contact avec les selles: Aptitudes et capacités		
bAD411s	À quel point est-il difficile de toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas difficile du tout
		2 Un peu difficile
		3 Modérément difficile
		4 Très difficile
		5 Énormément difficile
bAD412s	À quel point êtes-vous certaine que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD413s	À quel point êtes-vous certaine que vous pouvez trouver le temps pour toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD414s	À quel point êtes-vous certaine que vous pouvez disposer d'eau en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine

bAD415s	À quel point êtes-vous certaine que vous pouvez disposer de savon en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD416s	À quel point êtes-vous certaine que vous pouvez vous rappeler de toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout certaine
		2 Un peu certaine
		3 Modérément certaine
		4 Très certaine
		5 Énormément certaine
bAD421s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, même si ça prend beaucoup de temps pour que ça devienne une habitude?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD422s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, même si ça prend beaucoup de temps pour disposer d'eau en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD423s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, même si ça prend plus de temps que d'habitude pour disposer d'eau en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD424s	Imaginez-vous que vous êtes pressée, par exemple parce que vous avez faim et que vous voulez commencer à cuisiner: À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon avant de toucher à la nourriture?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD425s	Imaginez-vous que votre enfant est en train de pleurer: À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD426s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, même s'il n'y a pas d'impact visible?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance

bAD427s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, s'il y avait un endroit fixe pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD428s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, même si vous devez dépenser beaucoup d'argent pour disposer de savon en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD429s	À quel point avez-vous confiance que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles, même si vous avez moins d'argent à disposition pour disposer de savon en quantité suffisante pour le lavage des mains?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
bAD441s	Imaginez-vous que vous avez arrêté de vous laver les mains avec de l'eau et du savon après contact avec les selles pour quelques jours, par exemple parce qu'il n'y avait pas d'eau ou pas de savon à disposition. À quel point avez-vous confiance que vous allez recommencer de toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas de confiance du tout
		2 Un peu de confiance
		3 Modérément de confiance
		4 Beaucoup de confiance
		5 Énormément de confiance
Après contact avec les selles: Planification et oubli		
bAD507s	Est-ce que vous planifiez un dispositif pour vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Oui
		2 Non
bAD508s	Est-ce que vous planifiez toujours vous lavez les mains avec de l'eau et du savon après contact avec les selles dans un endroit spécifique?	1 Oui
		2 Non
bAD509s	Est-ce que vous planifiez où vous gardez le savon pour vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Oui
		2 Non
bAD521s	À quel point faites-vous attention à vous rappeler de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD522s	À quel point faites-vous attention pour disposer d'eau en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément

bAD523s	À quel point faites-vous attention pour disposer de savon en quantité suffisante pour toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD524s	À quel point faites-vous attention pour trouver le temps pour toujours vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout
		2 Un peu
		3 Modérément
		4 Fortement
		5 Énormément
bAD525s	À quel point êtes-vous consciente de votre but de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 Pas du tout consciente
		2 Un peu consciente
		3 Modérément consciente
		4 Beaucoup consciente
		5 Énormément consciente
bAD561s	À quel point de fois vous souvenez-vous de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 (presque) jamais
		2 Rarement
		3 Quelquefois
		4 Souvent
		5 (presque) toujours
bAD562s	Lorsque vous pensez aux dernières 24 heures: combien de fois vous est-il arrivé d'oublier de vous laver les mains avec de l'eau et du savon après contact avec les selles alors que vous en aviez l'intention?	1 (presque) jamais
		2 Rarement
		3 Quelquefois
		4 Souvent
		5 (presque) toujours
bAD563s	Est-ce que vous avez une astuce pour vous rappeler de vous laver les mains avec de l'eau et du savon après contact avec les selles? Si oui, laquelle?	
Après contact avec les selles: Obstacles et stratégies		
bAD544s	Combien de fois est-ce que ça arrive que vous êtes tellement pressée que vous ne trouvez pas le temps pour vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 (Presque) jamais 0-1 fois sur 10
		2 Certaines fois/ 2-3 fois sur 10
		3 La moitié du temps/ 4-6 fois sur 10
		4 La plupart du temps / 7-8 fois sur 10
		5 (Presque) à chaque fois / 9-10 fois sur 10
bAD534s	Quel est votre plan pour faire en sorte que vous pouvez toujours vous laver les mains avec de l'eau et du savon après contact avec les selles quand vous êtes pressée?	1 Le plan est:
		2 Pas de plan
bAD545s	Combien de fois est-ce que ça arrive que vous oubliez de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1 (Presque) jamais 0-1 fois sur 10
		2 Certaines fois/ 2-3 fois sur 10
		3 La moitié du temps/ 4-6 fois sur 10
		4 La plupart du temps / 7-8 fois sur 10
		5 (Presque) à chaque fois / 9-10 fois sur 10
bAD535s	Quel est votre plan pour faire en sorte de ne pas oublier de vous laver les mains avec de l'eau et du savon après contact avec les selles même si vous êtes pressée?	1 Le plan est:
		2 Pas de plan

bAD546s	Y a-t-il d'autres obstacles ou barrières au lavage des mains avec de l'eau et du savon après contact avec les selles?	1	Oui
		2	Non
bAD547s	Si oui, veuillez préciser les obstacles:		
bAD548s	Ces obstacles, à quelle fréquence est-ce qu'ils apparaissent?	1	(Presque) jamais 0-1 fois sur 10
		2	Certaines fois/ 2-3 fois sur 10
		3	La moitié du temps/ 4-6 fois sur 10
		4	La plupart du temps / 7-8 fois sur 10
		5	(Presque) à chaque fois / 9-10 fois sur 10
bAD536s	Quel est votre plan pour surmonter ces obstacles?	1	Le plan est:
		2	Pas de plan
Après contact avec les selles: Engagement			
bAD571s	À quel point est-ce que vous êtes engagée à vous laver les mains avec de l'eau et du savon après contact avec les selles?	1	Pas du tout engagée
		2	Un peu engagée
		3	Modérément engagée
		4	Très engagée
		5	Énormément engagée
bAD572s	À quel point est-il important pour vous de vous laver les mains avec de l'eau et du savon après contact avec les selles?	1	Pas du tout important
		2	Un peu important
		3	Modérément important
		4	Très important
		5	Énormément important
bAD573s	Dans quelle mesure est-ce que vous avez une obligation envers vous-même de vous laver les mains avec de l'eau et du savon après contact avec les selles (par exemple parce que vous avez pris cette résolution)?	1	Aucune obligation
		2	Un peu d'obligation
		3	Modérément d'obligation
		4	Beaucoup d'obligation
		5	Énormément d'obligation
bAD578s	Dans quelle mesure est-ce que vous avez une obligation envers les autres de vous laver les mains avec de l'eau et du savon après contact avec les selles (par exemple parce qu'ils connaissent votre résolution)?	1	Aucune obligation
		2	Un peu d'obligation
		3	Modérément d'obligation
		4	Beaucoup d'obligation
		5	Énormément d'obligation
bAD574s	À quel point vous sentez-vous contrainte à vous laver les mains avec de l'eau et du savon après contact avec les selles?	1	Pas du tout obligée
		2	Un peu obligée
		3	Modérément obligée
		4	Très obligée
		5	Énormément obligée
bAD575s	À quel point est-ce que vous vous fâchez si vous ne vous êtes pas lavé les mains avec de l'eau et du savon après contact avec les selles?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément
bAD576s	À quel point est-ce que vous faites des efforts pour vous laver les mains avec de l'eau et du savon après contact avec les selles, en dépit de difficultés?	1	Pas du tout d'efforts
		2	Un peu d'efforts
		3	Modérément d'efforts
		4	Beaucoup d'efforts
		5	Énormément d'efforts

bAD577s	À quel point est-ce que vous vous sentez bien si vous arriver à vous laver les mains avec de l'eau et du savon après contact avec les selles, en dépit de difficultés?	1	Pas du tout bien
		2	Un peu bien
		3	Modérément bien
		4	Très bien
		5	Énormément bien
bAD579s	À quel point est-ce que vous êtes contente si vous arriver à vous lavez les mains avec de l'eau et du savon après contact avec les selles, en dépit de difficultés?	1	Pas du tout contente
		2	Un peu contente
		3	Modérément contente
		4	Très contente
		5	Énormément contente
bAD570s	À quel point avez-vous mauvaise conscience si vous ne vous lavez les mains avec de l'eau et du savon après contact avec les selles?	1	Pas du tout
		2	Un peu
		3	Modérément
		4	Beaucoup
		5	Énormément

Utilisation de latrine

bAE201	Y-a-t-il une latrine que vous pouvez utiliser?	1	Oui
		2	Non
bAE202	Est-elle privée ou partagée?	1	Privée, pas utilisée par les voisins
		2	Privée, mais aussi utilisée par les voisins
		3	Propriété des voisins, mais l'enquêtée et leur famille peuvent l'utiliser
		4	Publique
		5	Institutionnelle
bAE203	Combien de ménages partagent la latrine?		
bAB401	Cette latrine, est-ce que vous l'utilisez?	1	Oui
		2	Non
bAB402	Pourquoi pas?		
bAB403	A quelle fréquence est-ce que vous l'utilisez quand vous avez besoin de déféquer?	1	(presque) jamais / 0 sur 10
		2	Rarement / 2-3 sur 10
		3	Moitié-moitié / 5 sur 10
		4	Souvent / 7-8 sur 10
		5	(presque) toujours / 10 sur 10
bAB404	A quelle fréquence est-ce que les enfants l'utilisent quand ils ont besoin de déféquer?	1	(presque) jamais / 0 sur 10
		2	Rarement / 2-3 sur 10
		3	Moitié-moitié / 5 sur 10
		4	Souvent / 7-8 sur 10
		5	(presque) toujours / 10 sur 10
bAB405	Question à réponse ouverte: Généralement: Pourquoi est-ce que vous utilisez votre latrine?	1	Pour ne pas voir / tomber sur les excréments des autres personnes
		2	Eviter les maladies / protéger la santé
		3	Moins dangereux qu'aller dans la brousse / éviter les attaques des serpents et autres reptiles
		4	Eviter les contaminations
		5	Eviter les odeurs
		6	Ne pas arriver à se mettre à l'aise dans la brousse / on est plus à l'aise dans la latrine, surtout quand il pleut
		88	Autre

bAB406	Est-ce que tous les membres de votre ménage utilisent la latrine ?	1	Oui
		2	Non
bAB407	Qu'est-ce que vous faites généralement avec les selles des enfants de moins de 5 ans?	1	Déposer dans WC / latrine
		2	Jeter dans la poubelle / nature
		3	Ne ramasse pas les selles
		4	Ne s'applique pas

Informations sur le ménage et sur la communication

	Avant de terminer, je vais encore vous poser quelques questions sur votre ménage.		
bAI241	Combien de fois est-ce que vous écoutez la radio?	1	Jamais
		2	Une fois par mois
		3	Entre deux et trois fois par mois
		4	Une fois par semaine
		5	Entre deux et quatre fois par semaine
		6	Tous les jours
bAI242	À travers quelle source est-ce que vous recevez les informations sur l'hygiène et l'assainissement?	1	Centre de santé
		2	Troupes de théâtre
		3	ASC
		4	Radio
		5	Bouche à oreille
		6	Journal
		88	Autre
bAI201	Combien de personnes habitent dans ce ménage?		
bAI202	Combien d'enfants inférieurs à 5 ans habitent dans le ménage?		
bAI203	Combien d'enfants entre 5 et 12 ans habitent dans le ménage?		
bAE003	Combien de litres d'eau vous avez à disposition chaque jour?		Litres
bAE004	Combien de personnes dans votre ménage utilisent cette eau?		Personnes
bAE005	Combien de temps est-ce que ça vous prend pour aller chercher de l'eau (aller et retour) ?		Heures
bAE301	D'où provient principalement l'eau que boivent les membres de votre ménage ?	1	Branchement privé
		2	Borne fontaine
		3	Puits protégé
		4	Source aménagée
		5	Source non-aménagée
		6	Puits non-protégé
		7	Système de collecte des eaux pluviales
		8	Vendeur privé
		9	Eau de surface
		99	Je ne sais pas
		88	Autre
bAE002	Combien payez-vous par an pour l'eau?		BIF
bAB501	Faites-vous quelque chose pour rendre l'eau plus saine à boire	1	Oui
		2	Non
bAB502	Habituellement, que faites-vous pour traiter l'eau de boisson ?	1	La faire bouillir
		2	Ajouter eau de javel / chlore
		3	La filtrer à travers un linge
		4	Utiliser un filtre (céramique / membrane / sable)
		5	Désinfection solaire
		6	Laisser reposer l'eau (décantation, floculation ou coagulation)
		88	Autre

bAI204	Quelle est votre activité principale?	1	Agriculteur
		2	Éleveur
		3	Agriculteur/Éleveur
		4	Commerçant
		5	Fonctionnaire
		88	Autre
bAI205	Quelle est l'activité principale de votre conjoint?	1	Agriculteur
		2	Éleveur
		3	Agriculteur/Éleveur
		4	Commerçant
		5	Fonctionnaire
		88	Autre
bAI206	Combien vous et votre famille dépensez-vous par semaine?		BIF
bAI207	Quels sont les revenus mensuels de votre ménage?		BIF
	Dans votre ménage, est-ce que vous (ou quelqu'un d'autre) avez une des choses suivantes (qui fonctionne)?		
bAI208	Electricité/Générateur	1	Oui
		2	Non
bAI210	Radio	1	Oui
		2	Non
bAI214	Télévision	1	Oui
		2	Non
bAI218	Réfrigérateur	1	Oui
		2	Non
bAI219	Vélo	1	Oui
		2	Non
bAI220	Voiture	1	Oui
		2	Non
bAI221	Moto	1	Oui
		2	Non
bAI222	Téléphone	1	Oui
		2	Non
bAI223	Est-ce que c'est votre propre téléphone?	1	Oui, c'est mon propre téléphone
		2	Non, il n'appartient pas à moi
bAI225	Table	1	Oui
		2	Non
bAI226	Chaise	1	Oui
		2	Non
bAI227	Lit	1	Oui
		2	Non
bAI228	Compte bancaire	1	Oui
		2	Non
bAI229	Montre	1	Oui
		2	Non
bAI230	Plaque solaire	1	Oui
		2	Non
bAI231	Fenêtres en verre	1	Oui
		2	Non
bAI239	Quel type de combustible utilisez-vous pour cuisiner?	1	Electricité
		2	Kérosène
		3	Chaume ou bois
		4	Gaz, biogaz ou gaz naturel
		5	Charbon
		6	Fumier
		88	Autre
	Quel est le nombre de bétail que vous possédez?		

bAI232	Vaches		
bAI233	Chèvres		
bAI234	Moutons		
bAI235	Porcs		
bAI236	Lapins		
bAI237	Volailles		
bAI238	Cochons d'inde		
bAI240	Où est-ce que les déchets ménagers sont-ils éliminés?	1	Déversés dans la rue ou dans un terrain vide
		2	Déversés dans une rivière
		3	Déversés dans un trou creusé
		4	Déversés dans la brousse
		5	Déversés derrière la maison
		6	Dépotoir d'ordures sauvage
		7	Dépotoir des déchets ménagers
		8	Compost
		9	Brûlés
		10	Déversés dans un trou
		88	Autre
bAR801	Pouvez-vous me montrer comment vous vous lavez d'habitude les mains après avoir utilisé les toilettes?	1	Oui, la personne a démontré
		2	La personne n'a pas pu démontrer/elle a refusé
bAR802	Comment la personne s'est-elle lavé les mains?	1	S'est rincé une main à l'eau
		2	S'est rincé les deux mains à l'eau
		3	S'est lavé une main au savon
		4	S'est lavé les deux mains au savon
		5	S'est rincé les mains à l'eau savonneuse
bAR803	D'où venait l'eau pour le lavage des mains?	1	Robinet/clapet comme source d'eau courante pour rincer les mains
		2	Gobelet/tasse/bol/louche pour verser l'eau sur les mains
		3	Bassine/cuvette/seau pour tremper les mains
		88	Autre: .....
		99	Incapable de voir
bAR804	D'où venait le savon pour le lavage des mains?	1	Le savon était placé près de l'eau utilisée
		2	Le savon n'était pas placé à proximité de l'eau utilisée
		3	L'eau savonneuse a été utilisée
bAR805	Quel type de savon a été utilisé?	1	Savon solide
		2	Savon en poudre
		3	Savon liquide
		88	Autre: ….....
bAR806	Comment les mains ont-elles été séchées?	1	Avec un essuie-mains
		2	À l'air
		3	Sur les vêtements
		88	Autre: ….....

Fin du questionnaire

bAI008	Date et heure de fin de l'enquête	
	S'il vous plaît, remerciez la personne interrogée	

Appendix III: Supplementary Material Chapter IV

Questionnaire used in Burundi and Zimbabwe to assess children's handwashing attitudes and practices (French version)

Please note: Data were collected in electronic form using Open Data Kit software on a tablet device.

Questionnaire pour les enfants			
Item Nr.	**Question**		**Options de réponse**
Introduction			
	Bonjour, mon nom est ..... et je vais te poser des questions sur toi, ta famille, tes ami(e)s, ce que tu ressens et ce que tu aimes faire. Tes idées sont très importantes pour aider à planifier des programmes et des services pour des jeunes comme toi. Nous avons visité ton école au cours des derniers jours pour voir comment y est la situation. Maintenant, nous serions très intéressés par ton opinion. D'autres élèves de ton école sont également interrogés. Ce questionnaire n'est pas un examen. Il n'y a pas de bonnes ou de mauvaises réponses. Certaines questions sont de nature personnelle et d'autres portent sur des choses que seulement certains jeunes font. Tout ce que tu souhaites dire ne sera répété à personne. Prends le temps qu'il te faut pour répondre à chaque question en indiquant ce que tu penses vraiment. Tu as le choix de participer à cette interview ou non. Tu n'es pas obligé de répondre à toutes les questions. Si une question te cause des difficultés, tu peux demander l'aide de l'intervieweur. L'enquête durera entre quinze et vingt minutes.		
	As-tu des questions que tu aimerais poser en ce moment ?		
	Aimerais-tu participer à cette enquête ?		
Informations sur l'enquête			
bCI001	Ménage du jour		1er ménage (avec observation) 2e ménage (sans observation)
bCI002	Code et nom de l'enquêteur		
bCI003	Commune		
bCI004	École primaire		
bCI005	Colline		
bCI006	Sous-colline		
bCI007	Nom de la mère		
bCI008	Date et heure de début de l'enquête		
bCI009	Heure de fin de l'enquête		
Informations sur l'enfant participant			
bCI101	Sexe		1 Masculin 2 Féminin
bCI102	Comment tu t'appelles ?		
bCI103	Quel est ton âge ?		
bCI104	Quel est le nom de l'école que tu fréquentes ?		
bCI105	Quelle classe est-ce que tu fréquentes ?		
bCI106	Quelle est ton affiliation religieuse?		1 Catholique 2 Protestante 3 Musulmane 4 Aucune affiliation religieuse 88 Autre
bCI107	Dans ton école, y a-t-il une cantine scolaire?		1 Oui 2 Non

État de santé

	Maintenant je vais te poser quelques questions sur la diarrhée.		
bCD121	Sais-tu ce que c'est la diarrhée ?	1	Oui
		2	Non
			Autre
bCD122	Quels sont les effets de la diarrhée sur le corps?	1	Selles liquides, aqueuses
		2	Perte d'eau et de sels minéraux, déshydratation
		3	Perte de poids, poids insuffisant
		4	Faiblesse, fièvre, maux d'estomac, nausée
		77	Croyance erronée
		99	Je ne sais pas
	Les docteurs disent aussi que la diarrhée est l'émission d'au moins trois selles molles ou liquides par jour, ou à une fréquence anormale pour l'individu. Des émissions fréquentes de selles bien moulées ne sont pas une diarrhée.		
bCD123	Peux-tu me dire pourquoi est-ce que les gens attrapent la diarrhée?	1	Ne pas se laver les mains avec de l'eau et du savon avant de toucher à la nourriture
		2	Ne pas se laver les mains avec de l'eau et du savon après contact avec les selles
		3	Consommer des aliments contaminés ou pourris
		4	Consommer de l'eau contaminée
		77	Croyance erronée
		99	Je ne sais pas
bCD124	Comment peux-tu te protéger contre la diarrhée?	1	Se laver les mains avec de l'eau et du savon avant de toucher à la nourriture
		2	Se laver les mains avec de l'eau et du savon après contact avec les selles
		3	Ne pas manger des aliments pourris, contaminés / cuire, couvrir, peler, laver les aliments
		4	Ne pas manger des aliments pourris, contaminés / cuire, couvrir, peler, laver les aliments
		5	Utiliser des latrines / couvrir les latrines
		77	Croyance erronée
		99	Je ne sais pas
bCB301	Au cours de la semaine passée, est-ce que tu as eu la diarrhée ?	1	Oui
		2	Non
bCB302	Au cours de la semaine passée, est-ce que tu étais absent/e de l'école à cause de la diarrhée ?	1	Oui
		2	Non
bCD101	Penses-tu que tu vas souvent attraper la diarrhée ?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD102	As-tu peur d'attraper la diarrhée?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD111	Est-ce que c'est grave si tu attrapes la diarrhée?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément

Le lavage des mains

	Maintenant je vais te poser quelques questions sur le lavage des mains.		
bCB101	Est-ce que parfois tu ne te laves pas les mains avec de l'eau et du savon?	1	Oui
		2	Non
bCB102	(Est-ce que parfois tu ne te laves pas les mains avec de l'eau et du savon?) Si oui, pourquoi?	1	Je l'oublie
		2	Je suis pressé
		3	Il n'y a pas d'eau
		4	Il n'y a pas de savon
		99	Je ne sais pas
		88	Autre
bCB103	Est-ce que parfois tu te laves les mains avec de l'eau et du savon?	1	Oui
		2	Non
bCB104	Si oui, pourquoi?	1	Prévenir les maladies
		2	Éviter les microbes
		3	Mes parents me le rappellent / me le disent
		4	Les instituteurs me le rappellent / me le disent
		5	Pour pratiquer une bonne hygiène
		99	Je ne sais pas
		88	Autre
bCD401	De quoi as-tu besoin pour te laver les mains comme il faut?		Eau
			Savon
			Cendres
			Bous
			Je ne sais pas
			Autre
bCD125	Pourquoi est-ce que c'est important de se laver les mains?	1	Prévenir des maladies
		2	Prévenir la diarrhée
		3	Prévenir le choléra
		4	Prévenir les maux d'estomac
		5	Pour pratiquer une bonne hygiène
		6	Éviter les microbes
		99	Je ne sais pas
		88	Autre
bCB201s	Lors de ton dernier jour à l'école, est-ce que tu t'es lavé les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1	Oui
		2	Non
bCB201f	Lors de ton dernier jour à l'école, est-ce que tu t'es lavé les mains avec de l'eau et du savon avant de manger?	1	Oui
		2	Non
bCB202s	Après avoir utilisé les toilettes à l'école, te laves-tu les mains avec de l'eau et du savon?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCB203s	Après avoir utilisé les toilettes à la maison, te laves-tu les mains avec de l'eau et du savon?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCB202f	Avant de manger à l'école, te laves-tu les mains avec de l'eau et du savon?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément

bCB203f	Avant de manger à la maison, te laves-tu les mains avec de l'eau et du savon?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD411f	Est-il difficile pour toi de toujours te laver les mains avec de l'eau et du savon avant de manger à l'école ?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD412f	Est-il difficile pour toi de toujours te laver les mains avec de l'eau et du savon avant de manger à la maison ?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD411s	Est-il difficile pour toi de toujours te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes à l'école?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD412s	Est-il difficile pour toi de toujours te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes à la maison?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD201	Est-ce que le lavage des mains avec de l'eau et du savon prend beaucoup de temps?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD202	Tu te sens comme une meilleure personne si tu te laves toujours les mains avec de l'eau et du savon?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD221	Est-ce que tu aimes toujours te laver les mains avec de l'eau et du savon?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD222s	Est-ce que tu te sens sale si tu ne te laves pas toujours les mains avec de l'eau et du savon après avoir utilisé les toilettes	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD222f	Est-ce que tu te sens sale si tu ne te laves pas toujours les mains avec de l'eau et du savon avant de manger?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément
bCD301s	Les autres enfants à l'école, est-ce qu'ils se lavent toujours les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout 2 Un peu 3 Beaucoup 4 Énormément

bCD301f	Les autres enfants à l'école, est-ce qu'ils se lavent toujours les mains avec de l'eau et du savon après avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD302s	Les membres de ta familles, est-ce qu'ils se lavent toujours les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD302f	Les membres de ta familles, est-ce qu'ils se lavent toujours les mains avec de l'eau et du savon avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD311s	Les instituteurs, est-ce qu'ils pensent que tu dois toujours te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD311f	Les instituteurs, est-ce qu'ils pensent que tu dois toujours te laver les mains avec de l'eau et du savon avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD312s	Tes parents ou les personnes qui s'occupent de toi, est-ce qu'ils pensent que tu dois toujours te laver les mains avec de l'eau après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD312f	Tes parents ou les personnes qui s'occupent de toi, est-ce qu'ils pensent que tu dois toujours te laver les mains avec de l'eau avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD571s	Est-ce que tu te sens coupable si tu ne te laves pas toujours les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD571f	Est-ce que tu te sens coupable si tu ne te laves pas toujours les mains avec de l'eau et du savon avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCE401	Est-ce que tu te laves les mains parce que tes parents ou les personnes qui s'occupent de toi te le disent?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCE402	Est-ce que tu te laves les mains parce que les instituteurs te le disent?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément

bCD413s	Est-ce que tu es sûr de toujours pouvoir te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes à l'école?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD413f	Est-ce que tu es sûr de toujours pouvoir te laver les mains avec de l'eau et du savon avant de manger à l'école?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD414s	Est-ce que tu es sûr de toujours pouvoir te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes à la maison?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD414f	Est-ce que tu es sûr de toujours pouvoir te laver les mains avec de l'eau et du savon avant de manger à la maison?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD421s	Imagine la situation suivante: Tu as besoin d'utiliser les toilettes, mais tes amis t'attendent. Ils sont très impatients. Tu es pressé. Est-tu sûr que dans une telle situation, tu vas te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD421f	Imagine une autre situation: Tu as vraiment faim et il est le temps de prendre le repas de midi à l'école avec tes camarades de classe. Est-tu sûr que dans une telle situation, tu vas te laver les mains avec de l'eau et du savon avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD521s	Fais-tu attention de toujours te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD521f	Fais-tu attention de toujours te laver les mains avec de l'eau et du savon après avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD561s	Est-ce que tu te rappelles toujours de te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD561f	Est-ce que tu te rappelles toujours de te laver les mains avec de l'eau et du savon avant de manger?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément
bCD001s	Est-ce que tu te laves les mains avec de l'eau et du savon après avoir utilisé les toilettes sans réfléchir?	1 Pas du tout
		2 Un peu
		3 Beaucoup
		4 Énormément

bCD001f	Est-ce que tu te laves les mains avec de l'eau et du savon avant de manger sans réfléchir?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD572s	Est-il important de toujours se laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD572f	Est-il important de toujours se laver les mains avec de l'eau et du savon avant de manger?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD573s	Est-ce que tu te sens obligé de toujours te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD573f	Est-ce que tu te sens obligé de toujours te laver les mains avec de l'eau et du savon après avant de manger?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD002f	Est-ce que tu as l'intention te toujours te laver les mains avec de l'eau et du savon avant de manger?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément
bCD002s	Est-ce que tu as l'intention te toujours te laver les mains avec de l'eau et du savon après avoir utilisé les toilettes?	1	Pas du tout
		2	Un peu
		3	Beaucoup
		4	Énormément

Buts et rêves

bCI108	Qu'est-ce que tu aimes jouer et faire quand tu n'es pas à l'école ?	1	Jouer au ballon
		2	Jeux à la corde
		3	Jeux à travers les chansons
		4	Jeux à la marelle
		5	Puiser de l'eau
		6	Garder les bétails
		7	Aider aux champs
		8	Faire la cuisine
		88	Autre
bCI109	Qu'est-ce que tu veux devenir quand tu seras grand ?	1	Président
		2	Enseignant
		3	Docteur / Médecin
		4	Soldat
		5	Journaliste
		6	Commerçant
		7	Infirmier
		88	Autre
bCI110	Quel est ton but, ton rêve dans la vie ?		

Fin de l'enquête

bCI009	Heure de fin de l'enquête	
	Merci beaucoup d'avoir pris le temps de parler avec nous! Nous avons terminé l'interview.	

Curriculum vitae

Elisabeth Seimetz
Date of birth: 1 July 1985
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EDUCATION

Apr. 2012 – Oct. 2015	**University of Zurich, Switzerland** PhD program in applied social and health psychology with an emphasis on behaviour change in the water and sanitation sector in developing countries
Oct. 2006 – Oct. 2011	**Ludwig-Maximilians-Universität, Munich, Germany** Degree in psychology (equivalent to an M.Sc.) with majors in clinical psychology and psychotherapy and human resource management (first class honours)
Oct. 2005 – Sept. 2006	**Charité – Universitätsmedizin, Berlin, Germany** First year of medical school (successfully completed)
July 2005	**Lycée de Garçons, Esch-sur-Alzette, Luxemburg** Secondary qualification in mathematics and sciences (first class honours)
Aug. 2002 – July 2003	**Brandywine High and Middle Schools, Niles, Michigan, U.S.** Exchange year in the United States (high school graduation diploma)

WORK EXPERIENCE

Apr. 2012 – Oct. 2015	**Eawag: Swiss Federal Institute of Aquatic Science and Technology, Switzerland** PhD student at the Department of Environmental Social Sciences: Participation in the externally funded projects "Handwashing Campaigns in India & Africa"
Jan. 2012 – Mar. 2012	**Trendiction S.A., Luxembourg** Temporary employee assisting in the improvement of a social data collection process and participating in the overall marketing and sales strategy development
Dec. 2009 – Mar. 2011	**MEAG MUNICH ERGO AssetManagement GmbH, Munich, Germany** Student assistant at the department of human resource development in charge of organization, support, and administration of seminars and team development measures
Mar. – Apr. 2009	**CHNP, Neuro-Psychiatric Hospital Centre, Luxembourg** Internship in psychology in a closed unit for adolescents with conduct disorder with focus on family therapy and social reintegration
Sept. – Oct. 2008	**Jugend- an Drogenhëllef, Luxembourg** Internship in psychology at a centre for substance abuse treatment in charge of heroin addicts and their relatives
Mar. 2008 – Mar. 2009	**Psychiatric Clinic of the Ludwig-Maximilians-University, Munich, Germany** Student assistant in the research group of psychiatric epidemiology and evaluation at the Department of Psychiatry, University of Munich
Oct. 2007 – Oct. 2009	**Autoplenum GmbH, Munich, Germany** Community manager and back office management of test reports for the online platform for automobile information autoplenum.de

RELEVANT TRAINING AND QUALIFICATION

Oct. 2011	**Training in Project Cycle Management, Luxembourg** Certified training (5 days) in Project Cycle Management, a methodology for the preparation, implementation, and evaluation of projects based on the principles of the logical framework approach for project planning and management (Ministry of Foreign Affairs, Luxembourg)
Nov. 2010 – June 2011	**Empirical diploma thesis on the long-term course of eating disorders, Munich, Germany** Preparation, implementation, and evaluation of an empirical diploma thesis on the long-term course of eating disorders in the field of epidemiology and evaluation at the University Hospital for Psychiatry and Psychotherapy, Munich (first class honours)
Mar. 2009 – Sept. 2010	**Trainer in social competence, Munich, Germany** Certified training of trainers in Social Competence (over a period of 18 months as part of my major in human resource management) including the development, implementation, and evaluation of tailored high-quality trainings for students as well as business customers (Ludwig-Maximilians-University Munich, Department of Psychology, Division of Social Psychology, under the supervision of Prof. Dr. Dieter Frey)
Apr. – July 2009	**Collaboration project in Change Management, Munich, Germany** Collaboration project in Change Management between the Ludwig-Maximilians-University Munich and Breitenstein Consulting including a weekly theoretical seminar (over five months), a two-day workshop, and the elaboration of a strategic business plan for a client as a first step towards high performance culture
Feb. 2009	**Sensitivity training, Munich, Germany** Sensitivity Training (5 days) followed by a complementary theoretical seminar (weekly two-hour class over five months) led by Dr. Monika Stützle-Hebel, chair of the German Society for Group Dynamics and Organizational Dynamics

LANGUAGES AND IT SKILLS

Microsoft Office, SPSS	Excellent skills
R (programming language for statistical computing)	Advanced skills
Luxembourgish	First language
German	Native speaker competence
English, French	Near native / fluent (C2)
Italian	Good command (B1)
Spanish, Portuguese	Basic communication skills (A1)